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Telegraph and Telephone Age

No. 1. NEW YORK, JANUARY 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY—IX.

A Study of Telegraphic Apparatus.

BY WILLIS H. JONES.

OFFICE LOOPS.

No doubt nearly every operator understands that an office loop is merely an extra set of sounders suitably located, and connected temporarily with some multiplex circuit which has no desk room to work on, yet there is often considerable ignorance of its construction and possibilities on the part of those who take the liberty of altering the position of the switch levers when anything goes wrong. It is to the latter that the subject matter of this article is directed.

The accompanying diagram, taken from the "Pocket Edition of Diagrams," shows the complete connections of an office loop outfit, as arranged by the Western Union Telegraph Company. It will be seen that the two sounders, one for the sending side and the other for the receiving side, are each looped to a springjack at the loopswitch which connects with a multiple set local apparatus, viz.: the polechanger and the contact points of the relay, with the latter of which they are connected respectively in series.

The sounders used are invariably the four-ohm pattern. The low winding is required in order that their addition to or removal from the uniform 100-ohm local circuits adopted for all multiplex loops will not appreciably alter the normal current of 250 milliamperes each local circuit is expected to carry. If a fifty-ohm sounder should be substituted the total resistance of the circuit would be abnormally increased and the volume of current correspondingly decreased, with the result that the four-ohm polechanger would not work properly.

Attention is called to this fact particularly, because now and then operators becoming dissatisfied with a sounder sometimes exchange sounders between adjoining desks and frequently pick out a fifty-ohm instrument. As they all look alike there is probably no thought that the exchange may prove harmful. The harm done is this: the fifty-ohm sounder may throw the branch office sounders out of adjustment by depriving them of sufficient current, while the low resistance of the four-ohm sounder, if substituted for the high wound sounder, may cause so much current to flow through the fuse as to melt it and open all the other sounders which take current through the same fuse. It is obvious, therefore, that operators should not make such exchanges without proper authority.

Another unfortunate habit many operators have acquired is that of cutting off branch offices the moment a loop opens and failing to restore the switch levers to their original position, after a short wait in order to ascertain if the opening was permanent or merely temporary. In some cases no attempt is made to investigate, and sometimes the change is not even reported. Such indifference may cause serious delay to branch offices before the situation is finally discovered. Operators should understand that many of these temporary openings are legitimate, yet unavoidable. Every time a newspaper loop is connected or removed temporary opening of the circuit will occur, and if the operator finds it necessary to turn the switches in order to break,

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he should invariably restore the connections at very short intervals to see whether the branch office loop has been closed or not. If within a reasonable time he finds the loop still open he should report the fact to his chief.

Again, in the event of a resistance lamp being broken, and a new one substituted, it should be understood that the latter must be one of a certain standard resistance. The resistance of these lamps is supposed to be approximately the same as that of the resistance of the loop it replaces, when the latter is removed temporarily. If the lamp substituted possesses a lower or a higher resistance than the loop, the operator will notice a difference in the strength of current flowing through his sounder when a loop is cut in and cut out. When a loop is cut in the lamp is not in circuit and when it is cut out the local circuit ends at the ground wire connected to the lamp. The "return wire" leading back to the loopswitch

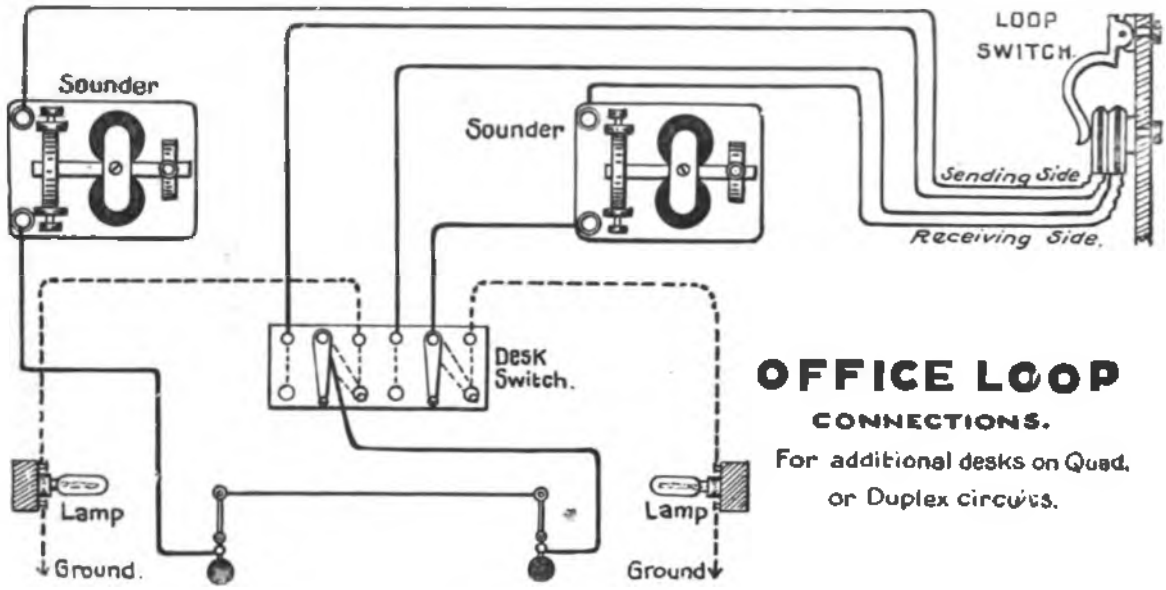

DIAGRAM OF OFFICE LOOP.

under these conditions is out of commission, being left open at the disk on the desk switch.

When this return wire becomes defective it is impossible to connect a branch office loop in series with the office loop, yet it is sometimes hard to convince laymen that the fault is in the office set and not in the branch loop, when requested to substitute another. They argue that the office loop is intact because it works all right when the branch loop is cut off. They apparently forget, or possibly do not know, that only half of the office loop conductors leading to and from the loopswitch, where the branch loop is connected, is in service when they cut the loop off. The loop chief is the only one who can detect this fault, which is usually due to a loose connection on the under lip of the springjack at the loopswitch or at the binding post of the local three-point switch on the operator's desk.

(To be continued.)

The Inventors' Guild.

The Inventors' Guild has been incorporated in New York.

The object of the guild, as stated in the constitution is "to advance the application of the useful arts and sciences, to further the interests and secure full acknowledgment and protection for the rights of inventors, to foster social relations among those who have made notable advances in the application of the useful arts and sciences."

Some of the handicaps to which the inventor is subject, other than the proverbial one of never having any money, are the delays in the Patent Office and the ineffectiveness of its work, due to overcrowding and lack of proper facilities in that office; the expense and tardiness of litigation, and the possibility that a rich and powerful corporation, by delaying and prolonging a suit, may increase the expenses to a point which makes such suits prohibitive for a poor inventor; the disadvantage to which the American inventor is subject in foreign patent offices, as compared with the liberality of the American Patent Office toward the foreign inventor, and many other conditions militating against the American inventor which should be remedied.

The officers of the Inventors' Guild are as follows: Mr. Ralph D. Mershon, president; Mr. Chas. W. Hunt, first vice-president; Mr. Chas. S. Bradley, second vice-president; Mr. Thomas Robins, secretary, and Mr. Henry L. Doherty, treasurer.

The professional committee is: Messrs. F. L. O. Wadsworth, chairman; Thomas A. Edison, Chas. S. Bradley, Peter Cooper Hewitt, Michael I. Pupin and Bion J. Arnold.

At the present time the Guild has twenty-nine members, including: Messrs. Bion J. Arnold, Thomas A. Edison, Stephen D. Field, Peter Cooper Hewitt, Dr. John F. Kelly, Ralph D. Mershon, Prof. Edwin F. Northrup and Prof. Michael I. Pupin.

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Branch Office Wiring.

BY JOHN F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE CO., NEW YORK.

The accompanying diagram shows in a very clear manner the Postal Telegraph-Cable Company's standard method for wiring branch offices. The wires from the cable head shown at the top of the illustration are brought directly to fuse blocks containing half-ampere fuses with lightning arresters, thence to spring-jacks mounted upon porcelain bases. The instruments are thus protected against damage in the event of accidental crosses with high potential or electric railway wires, as well as against damage by lightning. A small knife switch mounted on a porcelain block, shown between the fuses, is used for grounding. This switch is so arranged that when it is closed a loop is grounded between

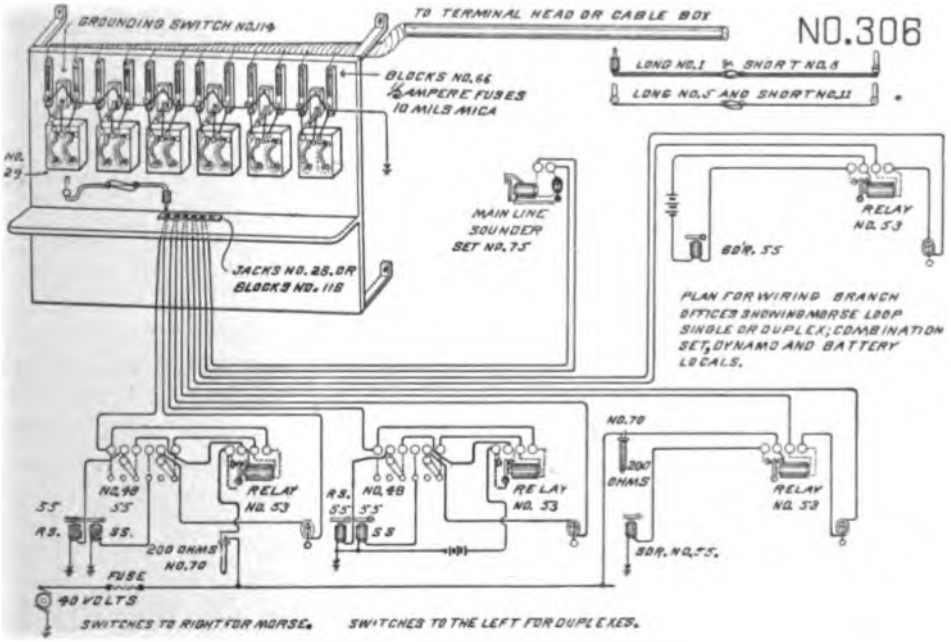

DIAGRAM OF BRANCH OFFICE WIRING.

two spring-jacks, thus permitting the use of each side of the loop to a ground through a separate spring-jack.

Round or "pin" jacks mounted on a porcelain bar are connected on a shelf or in the face of the board upon which the spring-jacks, fuse blocks, etc., are mounted. The office sets are permanently wired to these jacks. Connections between the pin jacks and line jacks are made by cords of suitable length having a wedge on one end and a plug on the other.

The wiring shown in the illustration comprises an ordinary Morse set with battery local, a similar set with dynamo local and combination sets which can be converted from Morse to grounded duplex legs with battery and with dynamo locals.

The dynamo arrangement shown is the one used where 40-volt current is fed to the branch office from the main office. Where 110-volt electric light current is used, 2,000-ohm coils and 150-ohm local instruments are required in place of the 200-ohm coils and ten-ohm instruments used with forty-volt pressure. The fuses shown are the standard one-half-ampere enclosed cartridge fuse.

Recent Telegraph and Telephone Patents.

No. 977,477. Cut-out Telephone System. To E. Gould, Spring Valley, Minn.

No. 977,452. Telegraph Sending Machine. To J. R. Jones, Port Arthur, Ont., Can. The machine is mounted on a pivoted frame and can be substituted for the ordinary key. Within the case or frame is a pendulum which sends the dots and dashes by a movement of the casing.

No. 977,536. Automatic Switch for Telephone Systems. To G. H. North, Cleveland, Ohio.

Nos. 977,616, 977,617, 977,618, 977,619, 977,620, 977,622, 977,623. Telephone Transmitter. To F. Gottschalk, New York.

No. 977,621. Sound Reproducing Device. To F. Gottschalk, New York.

No. 977,642. Means for Effecting Telephone Communication Without Connecting Wires. To H. G. Matthews, Gloucester, Eng.

No. 977,657. Telephone Transmission System. To O. T. Lademan, Milwaukee, Wis.

No. 977,658. Telephone Desk Stand. To W. Leaver, Chicago, Ill.

No. 977,721. Electric Battery. To C. J. Everett, New York.

No. 977,879. Electric Telegraphy. To J. Kajiura, Tokyo, Japan. This is a semi-bridge duplex system for cables and telephonic circuits with means for reducing the capacity of artificial cables by means of an artificial line corresponding to the line cable, and a balancing rheostat with self-inductances and capacities branching from the center of the rheostat.

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No. 977,981. Telephone Receiver. To H. R. Stuart, Wheeling, W. Va.

No. 978,070. Telephone Transmitter. To J. Sparks, Kimberly, Cal.

No. 978,075. Telephone Mouthpiece. To G. R. Taylor, San Francisco, Cal.

No. 978,079. Keyboard Telegraph Transmitter. To D. S. Troth, Oakland, Cal.

No. 978,083. Telephone Repeater System. To N. G. Warth, Columbus, Ohio.

No. 978,128. Telautograph. To R. W. Armstrong, New York.

No. 978,269. Automatic Burglar Alarm. To H. B. Collier, Prairie Grove, Ark.

No. 978,370. Telephone Receiver Support. To J. G. Harris and A. Mancuso, Philadelphia, Pa.

No. 978,435. Telegraph Transmitter Apparatus. To H. G. Davis, Williamsport, Pa.

No. 978,603. Testing System for Party Lines. To D. A. Lawyer and C. C. Bradbury, Chicago, Ill.

No. 978,709. Combined Telephone and Alarm or Kindred Service System. To W. W. Dean, Chicago, Ill.

No. 978,733. For Answer Back Signals has been granted to E. R. Gill, Yonkers, N. Y.

The following patents have expired:

No. 509,367. Switchboard Circuit and Signaling Apparatus. Issued to F. W. Dunbar and E. S. C. May, Newark, N. J.

No. 509,430. Printing Telegraph. Issued to Robert A. Fowden, Philadelphia, Pa.

No. 509,447. Train Signaling Apparatus. Issued to Joseph S. H. Pellot, Paris, France.

No. 509,477. Trunk Line Signal. Issued to E. S. C. May, Chicago, Ill.

No. 509,484. Signal Apparatus for Telephone Systems. Issued to J. J. O'Connell, Chicago, Ill.

No. 509,524. Police and Fire Alarm System. Issued to J. B. Gill, San Francisco, Cal.

No. 509,530. Telephonic Apparatus. Issued to W. S. Harrington, Hong Kong, China.

No. 509,873. Signaling Telegraph. Issued to M. J. Burns, Lowell, Mass.

No. 509,932. Testing Apparatus for Multiple Switchboards. Issued to Frank R. McBerty, Downers Grove, Ill.

No. 509,956. Annunciator for Telephone Switchboards. Issued to Charles E. Scribner, Chicago, Ill.

No. 509,964. Telegraph Key. Issued to Josef Steiner, Brooklyn, N. Y.

No. 509,965. Telephonic Transmission. Issued to John S. Stone, Boston, Mass.

Nos. 510,002, 510,003, 510,004, 510,005, 510,006 and 510,007. Telegraphy. Issued to Patrick B. Delany, South Orange, N. J.

No. 510,115. Electric Fire Alarm. Issued to Milton C. Cantrell, Springfield, Ohio.

No. 510,156. Circuit-Breaking Apparatus. Issued to John Burry, New York, N. Y.

No. 510,195. Automatic Telephone Exchange System. Issued to John Serdinko, New Braunfels, Tex.

Personal.

Prof. Alexander Graham Bell has been elected an honorary member of the Royal Institute of Great Britain.

Mr. J. Townsley, superintendent of construction at Montreal for the Canadian Pacific Railway Company's telegraph, retired on January 1.

Mr. H. F. Thurber, vice-president and general manager of the New York Telephone Company, gave an address on the subject, "Our Business Associates," before the meeting of the Telephone Society of New York, on December 19.

Mr. H. E. Dunham, formerly associate editor of Telegraph and Telephone Age, now an assistant examiner of patents in the Patent Office, Washington, D. C., was a recent New York visitor, enroute to his home in Syracuse, where he spent the holidays.

Mr. Hugh P. Trainor, district engineer of the government telegraphs, Pretoria, South Africa, will begin a six months' leave of absence on January 1 and will visit England, the United States and Australia, where he will examine the telegraph systems and kindred interests in these countries.

We have received from Mr. F. W. Jones, former electrical engineer of the Postal Telegraph-Cable Company, who, with Mrs. Jones, is spending the winter at Palm Beach, Fla., a neat Christmas card bearing greetings from that country of balm and sunshine.

Superintendent of Insular Telegraphs at Porto Rico.

Mr. A. W. Metzger, of the Cumberland Telephone and Telegraph Company, Louisville, Ky., has resigned to accept the government position of Superintendent of Insular Telegraphs at Porto Rico. Mr. Metzger is a native of Louisville, having been born December 20, 1871. During his entire business career, he has been in the service of the Cumberland Telephone and Telegraph Company in Louisville. He was chief electrician for the company in the Louisville district at the time of his resignation. Mr. Metzger sailed from New York December 17 for his new post. While in this city he called on many of his friends.

Mr. Metzger was the guest of honor at a banquet given by the employes of the Cumberland Telephone and Telegraph Company in the Louisville district, on the eve of his departure.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. P. Bruch, vice-president of this company, was in Buffalo, Rochester, Syracuse and Albany recently on business connected with the service.

Mr. H. F. Hawkins has been appointed chief clerk in the office of Traffic Superintendent F. F. Norton vice Mr. G. W. Fleming resigned.

The money transfer bureau of this company has

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been separated from the cashier's department. Mr. E. S. Butterfield is general agent of the money transfer bureau while Mr. J. A. Manning has been appointed cashier and Mr. C. H. Walter becomes assistant cashier.

Mr. George Marshall Purdy, manager of the Postal Telegraph-Cable Company at Cleveland, Ohio, whose appointment was recorded in a previous issue, was born on a farm near West Unity, Ohio, February 22, 1874, and in June, 1890, entered the telegraph service as messenger for the Western Union Telegraph Company at Mansfield, Ohio, afterward serving as operator at Canton, Ohio, for the same company. Between January, 1896, and September, 1909, he was manager of the Postal Telegraph-Cable Company, at Mansfield, and from September 1, 1909, until December 15, 1910, was manager of the Dayton, Ohio, office of the same company. On the latter date he received the appointment of manager of the Cleveland office.

Mr. Eugene Yates Onderkirk, who was recently appointed manager of this company, at Wheeling, W. Va., was born at Saratoga Springs, N. Y., May 31, 1868, and in the summer of 1882 he entered the telegraph service at that place. He was manager of the Commercial Union Telegraph Company at Saratoga, N. Y., and afterwards was manager for the Postal Company at Titusville, and Johnstown, Pa. He has worked as operator at Albany, Buffalo and New York. He took charge of the Wheeling office November 1 last. Mr. Onderkirk is a member of the Old Time Telegraphers and Historical Association.

Mr. J. H. Dorsey has been appointed manager of this company at Los Angeles, Cal., vice V. V. Stevenson transferred to San Francisco as division electrical engineer.

Mr. John D. Prosser, night traffic chief of the Philadelphia office has resigned to engage in farming at Boulogne, Nassau County, Florida. On his last night at the office (November 30), he was presented by his associates with a double-barreled gun, a hunting coat and other hunting paraphernalia. On the night of December 1, Mrs. Prosser entertained the force at her home in West Philadelphia. About fifty guests entered the room with hoes, rakes, shovels, pitchforks and other farming implements, all of which were presented to Mr. Prosser.

Mr. Charles Henry Johnson, formerly chief operator of the Memphis, Tenn., office, has been appointed manager to succeed Mr. J. F. Wilson, appointed district commercial manager. Mr. Johnson was born at Holly Springs, Miss., May 3, 1871, and entered the telegraph service in that place in 1887. He worked in various railroad and Western Union offices and entered the service of the Postal Telegraph-Cable Company in 1909.

Mr. W. E. Pope, wire chief of the Memphis, Tenn., office, has been appointed chief operator, vice Mr. C. H. Johnson, advanced to the managership of that office.

President Clarence H. Mackay recently entertained the heads of departments of the company in Chicago at a performance of grand opera. On subsequent nights he entertained all other employes, including the messengers.

Mr. J. S. Ellis has been appointed assistant to the general superintendent of plant with headquarters in New York.

The wife of Mr. W. L. Hallett, of the supply department, New York, died on December 19.

Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Company and the Commercial Cable Company, has sent a woolen sweater as a personal Christmas gift from him to every one of the 5,000 messenger boys employed by his companies in America.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee, has returned from his trip to Europe.

Messrs. Belvidere Brooks, general manager; W. N. Fashbaugh, traffic engineer of this company; W. H. Baker, vice-president of the American District Telegraph Company of New Jersey, and W. C. Merly, secretary to the general manager, were recently in Chicago, Detroit, Toledo, Cleveland and Buffalo on business connected with the service. Conferences were held with the company's officials and representatives at those places.

Mr. W. B. Powell, district traffic chief, Atlanta, Ga., is now located in Louisville, Ky., his headquarters having been changed to the latter city.

Mr. F. E. Horton has been appointed district plant superintendent, second district, Mountain Division, with headquarters at Salt Lake City, Utah, vice Mr. R. P. Cowardin.

Mr. A. L. Wellington has been appointed chief clerk in the office of Mr. E. Boening, district commercial superintendent at Seattle, Wash. Mr. Wellington was assistant manager of the Seattle office at the time of his recent appointment.

Mr. D. C. Dawson, district traffic superintendent of the sixth district, with headquarters at St. John, N. B., has been appointed general agent of the Company in the Maritime Provinces, including Newfoundland. These new duties are additional to those of the position of district traffic superintendent.

Mr. W. S. Barker has been appointed district plant superintendent at Boston, Mass.

A quarterly dividend of three-fourths of one per cent was declared by the directors on December 14, payable on and after January 16. The report for the quarter ending December 31 shows estimated net earnings of $1,226,937.50, after deducting the interest on bonded debt. The surplus, after deducting the dividends, is $8,973,067.59.

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Mr. J. F. Wilson, manager of the Postal Telegraph-Cable Company, Memphis, Tenn., has accepted the position of district commercial manager for this company, with headquarters in that city. Mr. Wilson was born in Rankin County, Miss., September 12, 1881, and began his telegraphic career in August, 1896, as messenger for the Western Union Telegraph Company in Memphis. He remained with that company until 1901, when he entered the service of the Postal Telegraph-Cable Company at Memphis. He has held the positions of operator, traffic chief, wire chief, night chief operator, chief operator, and finally became manager of the office.

Mr. A. C. Kaufman has been appointed commercial agent of the Eastern Division, with headquarters in New York.

A. R. McGrath, assistant manager of the Postal Telegraph-Cable Company, Chicago, has resigned to accept a position as special agent for this company, with headquarters at that place.

Mr. George Laidlaw, recently appointed manager of the Halifax, N. S., office, is a native of that city, being born January 31, 1879. In 1895 he entered the telegraph service at Halifax as messenger and has filled the positions of clerk, operator, chief operator and has finally become manager of the office.

Mr. H. C. Worthen, general superintendent Southern Division, Atlanta, Ga., was the guest of honor at a banquet given in that city, December 10, by the members of the traffic and plant departments. Mr. D. M. Therrell, division traffic superintendent, made the speech of welcome. Those present, in addition to those mentioned, were E. E. Williams, district commercial superintendent; G. W. Lloyd, district traffic superintendent; W. A. Neill, district plant superintendent; L. B. Thompson, J. E. Scofield and L. J. Amsden, Atlanta; W. G. Peebles, district traffic superintendent, and W. K. McClarin, district plant superintendent, Nashville, Tenn.; F. O. Nourse, district traffic superintendent, and J. B. Faulkner, district plant superintendent, Richmond, Va.; W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., and J. C. Duane, district plant superintendent, Jacksonville, Fla.

Mr. W. B. Tyer, chief clerk and assistant manager of this company's office at Houston, Tex., has been appointed manager of the Fort Worth, Tex., office.

Mr. George Laidlaw has been appointed manager of the Halifax, N. S., office of this company to succeed Mr. C. W. McKee, promoted to be district commercial superintendent at St. John, N. B. Mr. John Eckersley and Mr. John Fitzpatrick of the Halifax office, have been appointed day and night chiefs respectively.

Mr. George R. Allen has been appointed district traffic superintendent, first district, of the Mountain Division, Denver, Col.

Mr. Allen is a native of Colorado, and entered the service of the Western Union Telegraph Company as a messenger in 1887, and was employed in various capacities by that company until 1896, when he entered the service of the Associated Press at Denver. In 1903 he was appointed chief operator of the same association in New York. In 1907 he returned to the Denver bureau as chief operator, which position he held at the time of his recent appointment.

Mr. Henry J. Kinnucan, recently appointed division general agent at Detroit, Mich., was born in Detroit, and after graduating from the public schools of that city, went with the Western Union Telegraph Company as messenger in 1875. In the sixteen years he remained with the company, he advanced through various positions until he became chief clerk to the superintendent. In 1891 Mr. Kinnucan became manager of the Postal Telegraph-Cable Company's Detroit office, then recently

H. J. KINNUCAN,
Division General Agent, Detroit.

opened. A year later he was appointed assistant superintendent of the first district, and was placed in charge of the Michigan lines and offices, including Toledo, Ohio. When the territory was divided a year or so later he was advanced to the superintendency. Mr. Kinnucan held this latter position at the time of his recent appointment to the Western Union service.

Municipal Electricians.

Mrs. Ehore Adelia Foster, mother of Mr. Frank P. Foster, of Corning, N. Y., former secretary of the International Association of Municipal Electricians, died at her home in Caton, N. Y., at the age of 71 years.

Patent No. 978,626 has been issued to J. G. Nolan, of Chicago, for an Automatic Electric Signaling System. This is a fire alarm system which distinguishes between the trouble signal and the alarm signal.

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The Telephone.

Ear-rings are no longer in vogue except among telephone girls.—*Philadelphia Ledger.*

Mr. C. F. Mason, commercial engineer of the Pacific Telephone and Telegraph Company, has been promoted to the position of district commercial superintendent of the same company, with headquarters at Los Angeles, Cal.

Mr. John A. Howard, of Wheeling, W. Va., one of the organizers of the Continental Telephone and Telegraph Company, has filed a voluntary petition in bankruptcy. It is stated that his assets exceed his liabilities. He was endorser of notes of independent telephone companies comprising the Continental Company, to the extent of about $1,000,000.

The Southwestern Telegraph and Telephone Company is planning to erect a new exchange building in Houston, Tex.

Charged with Wrecking a Telephone Company.—Former State Senator Henry H. Evans, of Illinois, and his co-officers in the Interstate Telephone and Telegraph Company, E. R. Conklin and S. H. Case, are charged by the receivers of the company, Fred A. Dolph and William C. Niblack, with having "milked" the company of $1,231,000. Suit has been filed against them in the United States Circuit court at Chicago to collect this amount. It is stated that Evans paid himself nearly $40,000 out of the funds of the company, four days before the interest on the bonds came due. As a consequence, the depleted treasury did not contain the money to pay the interest.

The New York Telephone Company has petitioned the Public Service Commission, Second District, for approval of the transfer to it of the franchises of The Empire State Telephone and Telegraph Company. The latter company is now operating a public telephone system in the counties of Wayne, Ontario, Oswego, Yates, Cayuga, Seneca and Cortland, and on April 1, 1909, it conveyed all of its property, rights, privileges and franchises to the Central New York Telephone and Telegraph Company, which latter company has been merged into the New York Telephone Company. The capital stock of the Empire Company is $200,000, which the New York Telephone Company now owns.

New Telephone Exchange for London.—The Post Office authorities in London, England, are converting a large block of buildings in St. James's Square, E. C., into a new telephone exchange.

Telephone Conference.—The monthly conference of exchange managers and contract agents of the New England Telephone and Telegraph Company was held in Springfield, Mass., recently. Among those present were Messrs. G. G. S. Perkins, superintendent of the Directory Department, and R. P. Jones of the Auditing Department, Boston, and Messrs. G. W. Learned, contract agent, and H. R. Leathers, manager, Holyoke, Mass.

Telephone Equipment for San Francisco Western Union Offices.

The plant department at San Francisco has just completed and placed in service at the Western Union Telegraph Company's main office in that city, a special telephone equipment and storage battery plant. This equipment consists of a ten-position multiple switchboard, specially designed to take care of local switching; also to properly handle the large number of telegrams that are now being sent and received over the telephone. This switchboard is stated to be the first of its type to be installed on the Pacific Coast.

American Telegraph Typewriter Company.

The American Telegraph Typewriter Company, 72 William street, New York, which is handling the Cardwell telegraphic typewriter, is now in a position to meet the demand for these instruments. This machine is used interchangeably as a transmitter or receiver, and has received a practical test, extending over a year, on the lines of the Long Island Railroad Company between Long Island City and the Brooklyn terminals. Mr. L. S. Wells, superintendent of telegraph of that company, makes a favorable report upon the results attained. These typewriters are connected on a telephone circuit and the operation is carried on simultaneously with telephonic conversation, without in any way interfering with the latter. The system, which is economical, flexible and rapid, having no complicated mechanism, will prove a most valuable substitute for present methods.

This typewriter is in daily operation between Philadelphia and New York and orders have already been received for instruments from the Government and from several railroad companies. The construction of the instrument is so simple that only the ordinary office help is required to operate it. It is stated to be the only printing telegraph of one unit that can be placed on any circuit with intermediate stations to be operated selectively, or a message can be sent to any number of machines simultaneously. It is suitable for long or short haul and terminal service.

The machines have been tested in the New York city police headquarters, and the demonstration, it is stated, was very successful. The City News Association, which supplies practically all the daily newspapers of New York city with routine news reports, gave an order to place one of them in the offices of each of the daily papers. These machines are now being installed. One of the principal functions of the machine is that it may be used to supplement and increase the use of telephone and telegraph wires.

The system has also been tested on board the United States battleship Nebraska, with a view to determining its utility in communicating range and target observations and fire control orders in time of battle to all parts of the ship.

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Death of S. S. Dickenson, Vice-President and General Superintendent of Commercial Cable Company.

Samuel S. Dickenson, vice-president and general superintendent of the Commercial Cable Company, died at his residence, 430 West 116th Street, New York, December 23, of an obscure ailment causing impoverishment of the blood. He was born at Plymouth, England, May 8, 1852. He began his career as a telegrapher in England in 1867 and has been identified with submarine cable interests for many years. He went to Nova Scotia, where, in 1874, he helped to establish the Torbay station of the Direct United States Cable Company. He particularly distinguished himself as an expert in the then little understood art of applying the duplex apparatus to submarine telegraph cables.

In 1884 he joined the Commercial Cable Company, just then organizing. He established its cable station at Hazelhill, Canso, N. S. He was the superintendent of this station for twenty years and he made it a model of efficiency. Meantime he undertook important work for the same interests in other parts of the world.

THE LATE SAMUEL S. DICKINSON.

In 1900 he established the Commercial Cable station at Fayal, Azores, and opened the first cable communication between Portugal, the Azores Island and North America. For his services in this connection he was decorated by King Carlos of Portugal.

In 1901 he was sent to Honolulu, Midway, Guam and Manila to select landing places and sites for the Commercial Pacific cables and stations. How well he succeeded is attested by the fact that the cables have remained undisturbed and uninjured in the places he selected.

On January 1, 1904, he was appointed general superintendent of the Commercial Cable Company and shortly thereafter he became a member of the Board of Directors and was elected a vice-president. He was also a director in the Commercial Pacific Cable Company.

No telegraph man was better known or more esteemed throughout the entire cable and telegraph service than was Mr. Dickenson. He was a man of noble character, great ability and much tact; an expert electrician and had few equals as an allround telegrapher. As a manager of men Mr. Dickenson had no superior, thoroughly straightforward in all his dealings, he possessed a most kindly disposition and was much respected by his subordinates. All who knew him deplore his death.

Mr. Dickenson was a member of the British Institution of Electrical Engineers and of the American Institute of Electrical Engineers.

As a mark of respect to his memory, all the circuits of the Commercial Cable and Commercial Pacific Cable companies were silenced for a few minutes during the funeral services which were held at the church of St. Ignatius Loyola, Park Avenue and 84th Street, at 10 a. m., December 26. The pall bearers were: Mr. Clarence H. Mackay, Mr. Geo. G. Ward, Mr. Geo. Clapperton, Mr. W. W. Cook, Mr. E. J. Nally, and Dr. G. D. Stewart. The service was attended by many cable and telegraph officials and other employes and friends. The body was taken to Antigonish, N. S., for interment. Mr. Dickenson leaves a widow, three sons and a daughter.

The Cable.

The Eastern and Eastern Extension telegraph companies, acting in conjunction with Reuters Telegram Company, have agreed to supply to the newspapers of India, South Africa and Australia a largely increased amount of British imperial news, it being an essential part of the arrangements that Reuters makes no extra charge to newspapers in India and the colonies.

The Commercial Cable Company is distributing a leaflet describing some fast telegraphic work. On November 16 Messrs. S. Marshall Bulley & Son, of Houston, Tex., filed at 9:58 a. m. with the Postal Telegraph-Cable Company an order to be delivered to their correspondents in Liverpool, England, before 10 a. m., that time corresponding with the time of the closing of the Liverpool cotton market—4 p. m. This cablegram was relayed at New Orleans and New York, thence transferred to the Commercial Cable Company at New York and sent to Waterville, Ireland, then to Liverpool, being handled by twelve or fourteen persons. The message reached its destination within the time limit—two minutes.

Mr R. L. Dean of Chicago, the inventor of the Dean Rapid Printing Telegraph System, in renewing his subscription for another year takes occasion to say: "I consider Telegraph and Telephone Age the most progressive and valuable publication of its kind in America. Kindly accept my best wishes for the success it deserves."

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Standard Definitions of Electrical Terms.

The careless and indiscriminate use of electrical terms and symbols often leads to doubt and confusion in the minds of electrical students. Our old friend $C = \frac{E}{R}$, for instance, under the modern nomenclature has become changed to $I = \frac{E}{R}$. The meaning of this formula has not been changed, however—only one of the symbols. Again, the familiar "dynamo" is no longer known as a dynamo. It is a "generator," which is a broader and more definite term. The machine itself has undergone no change, only its name. We might call a rose a cabbage, but it would still be the fragrant flower we know it to be.

It is always advisable to call things by their right names. In the early days of electrical development many monstrosities crept into the language of electricity, and because electrical knowledge was not then reduced to a scientific basis, these hybrids found general acceptance, there being no one qualified to challenge them. In later times it was found necessary to revise electrical terminology to make the terms and definitions agree with the facts. It is slow work dislodging the undesirable and ambiguous terms, but all up-to-date telegraph engineers and electrical engineers are overcoming the bad habits of earlier days of calling things electrical by improper names, and are now calling them by their right names. That is, they are right names as far as human wisdom and experience can make them right. Some day in the future, when we know more than we do now, we may find it necessary to revise our present system; but we need not worry about that now, as long as we are doing the best we can in our present state of knowledge.

"Be sure you are right, then go ahead" is a safe rule to follow always. In order to point out to electrical students the right way to go, so that they can "go ahead" without fear, we give the standard and authorized definitions of electrical terms for electrical quantities, machines, etc., as promulgated by the American Institute of Electrical Engineers and foreign electrical societies. In some instances these definitions have been amplified in order to make them clearer to those who are not advanced in their knowledge of electricity.

SYMBOLS.

The following notation is recommended by the Institute and has been generally adopted. The full list of symbols is not given, but only those that are in ordinary use.

E, *e*, for voltage, electromotive force, (emf) potential difference, pressure and tension. All of these terms are synonymous.

I, *i*, for current—not *C* or *c*.

R, *r*, for resistance. This is not changed. The expression of Ohm's law under the new system of notation is $I = \frac{E}{R}$, not $C = \frac{E}{R}$, as formerly. The *C* has been adapted to another use. It now represents capacity, as noted further.

P, for power.

Φ. (Greek letter phi), for magnetic flux.

$\mathfrak{B}$. *b*, for magnetic density. The letter $\mathfrak{B}$ is German script.

C. *c*, for capacity (the capacity of a condenser, or of a line or a cable, for instance).

G, *g*, for conductance.

DEFINITION OF CURRENTS.*

1. *"A Direct Current* is a unidirectional current," that is, acting in one direction. Such a current may be varied in strength but its direction does not change.
2. *"A Continuous Current* is a steady or non-pulsating, direct current." A current from a battery or a generator in a circuit with a fixed resistance is an example of a continuous current.
3. *"A Pulsating Current* is a current equivalent to the superposition of an alternating current upon a continuous current."
4. *"An Alternating Current* is a current which, when plotted, consists of half-waves of equal area in successively opposite directions from the zero line." In other words, it is a current that flows first in one direction then in the opposite direction alternately.
5. *"An Oscillating Current* is a current alternating in direction, and of decreasing amplitude." The discharge from a Leyden jar or a condenser gives a current of this kind, the energy growing less and less until it is entirely dissipated. The discharges from the spark gap of wireless telegraph induction coils are also of this kind.

ROTATING MACHINES.

6. *"A Generator* transforms mechanical power into electrical power." The so-called "dynamo" is a generator, because under the above definition, it is driven by mechanical power and delivers electrical power. The mechanical power is transformed into electrical power. The mechanical power may be supplied by a steam engine, a gas engine, a steam turbine, a water wheel, etc.
7. *"A Direct-Current Generator* produces a direct current that may or may not be continuous." The machines used for generating telegraph currents are direct-current machines.
8. *"An Alternator or Alternating Current Generator* produces alternating current, either single-phase or polyphase." Such a machine generates current of the character described in definition 4.

*In these definitions the portions within the quotation marks are the standard definitions. The rest is explanatory.

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9. "*A Double-Current Generator* produces both direct and alternating currents." It has a commutator at one end of the armature where direct current is obtained, and at the other end of the armature it has collector rings, at which point alternating currents are delivered.

10. "*A Motor* transforms electrical power into mechanical power." It will be noticed that this definition is just the reverse of that of a generator. A motor is driven by electrical power and delivers mechanical power, while, as already explained, a generator is driven by mechanical power and delivers electrical power.

11. "*A Booster* is a machine inserted in series in a circuit to change its voltage." The booster may be driven by an electric motor or otherwise. It is usually used on electric railway and other lines where the drop of voltage is heavy.

12. "*A Motor-Generator* is a transforming device consisting of a motor mechanically connected to one or more generators." In telegraph offices motor-generators are used to generate energy of suitable voltage for the operation of the main lines and of local circuits. They are usually driven by energy obtained from the electric light circuit within the building.

13. "*A Dynamotor* is a transforming device combining both motor and generator action in one magnetic field with two armatures; or with an armature having two separate windings and independent commutators."

14. "*A Converter* is a machine employing mechanical rotation in changing electrical energy from one form into another." A converter may belong to either of several types, as follows:

a. "*A Direct-Current Converter* converts from a direct current to a direct current.

b. "*A Synchronous Converter* (commonly called a rotary converter) converts from an alternating to a direct current, or vice versa.

c. "*A Motor-Converter* is a combination of an induction motor with a synchronous converter, the secondary of the former feeding the armature of the latter with current at some frequency other than the impressed frequency, i. e., it is a synchronous converter concatenated with an induction motor.

d. "*A Frequency-Converter* converts from an alternating-current system of one frequency to an alternating current system of another frequency, with or without a change in the number of phases or in voltages.

e. "*A Rotary Phase Converter* converts from an alternating-current system of one or more phases to an alternating-current system of a different number of phases, but of the same frequency."

STATIONARY INDUCTION APPARATUS.

15. "*Stationary Induction Apparatus* changes electric energy to electric energy through the medium of magnetic energy. They comprise several forms, distinguished as follows:

a. "In *Transformers* the primary and secondary windings are insulated from each other.

b. "In *Auto-Transformers*, also called compensators, a part of the primary winding is used as a secondary winding, or conversely.

c. "In *Potential Regulators* a coil is in shunt and a coil is in series with the circuit, so arranged that the ratio of transformation between them is variable at will. They are of the following three classes:

a. "*Compensator Potential Regulators* in which a number of turns of one of the coils are adjustable.

b. "*Induction Potential Regulators* in which the relative positions of the primary and secondary coils are adjustable.

c. "*Magneto Potential Regulators* in which the direction of the magnetic flux with respect to the coils is adjustable.

d. "*Reactors, or Reactance Coils*, formerly called choking coils, are a form of stationary induction apparatus used to produce reactance or phase displacement."

NOTE. There is an important difference between the apparatus called a "Converter" and a "Transformer." These two terms are often used indiscriminately. As noted in definition 14, a Converter is a machine with a revolving member, while a Transformer, as explained in definition 15, has no moving parts, the primary and secondary coils being in fixed relations to each other.

16. *A Rotor* is the rotating member of a machine. This member is usually the armature but in some machines it may be the field magnet structure, with the armature stationary.

17. *A Stator* is the stationary member of a machine. It is evident from the definitions that a rotating machine has a revolving member and a stationary member, and that the revolving part may be the armature or the field magnets.

Arrest of Wire Thieves.—Four young men were arrested in North Bergen, N. J., recently, charged with stealing wire from the Western Union Telegraph Company and the Erie Railroad Company. Much annoyance and loss have been sustained by these and other companies lately from thefts of wire and until now the culprits have eluded detection.

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Wireless Telegraphy and Wireless Telephony.*

The subject of wireless telegraphy will undoubtedly still remain a subject more or less surrounded by mystery to the lay mind for many years to come, predicts London *Engineering*, a circumstance which it deems the more anomalous from the fact that no scientific theme has been more exploited (with the exception of radium, perhaps). The scientist knows, however, that wonderful as the subject undoubtedly is, there is not nearly so much mystery investing the transmission of intelligible signals from a ship at sea over even a thousand miles as there is in one of the commonest facts in life—the transmission of light from the stars to the earth over a distance so great that the human mind cannot make an attempt to grasp its significance.

Nevertheless, many engineers daily conversant with phenomena quite as remarkable as that involved in wireless telegraphy seem to have very hazy notions of the principles employed, remarks our expert authority, while the allied subject of the future —wireless telephony—scarcely seems to be even grasped by many engineers. As the investigations of the illustrious Professor J. J. Thomson into electricity and magnetism are now so well known, this ignorance is inexcusable. Unquestionably the term wireless itself is responsible for a great deal of the misunderstanding. "Ethereal waves," or better, radio-telegraphy, would much better express the facts, although such a change in nomenclature is unlikely to be made at this day.

"If it were taught as an elementary fact in our schools that, besides the atmosphere, the whole of space, so far as we know, is permeated with an invisible ether, and that just as we can produce a disturbance in a pool of water by dropping a stone into one part, so can we produce a traveling disturbance in the ether by analogous methods, we should have a much clearer conception of wireless telegraphy existing in the lay mind. Recent developments in this subject have been more in the perfecting of complex details rather than in any remarkable change in principles. Practical advancement has gone ahead at such a rate as to leave theory somewhat behind, and, as a consequence, many of the most skilful minds in science have been elaborating and perfecting the theory. The probable result will be that the future will see a steady advancement just as soon as some of the more difficult points have been cleared up.

"It is true that the number of systems in employment are still extraordinarily numerous. This would point to the fact that the best form has not yet been reached, as in that case it would inevitably leave others in the background. Since October 17, 1907, the transatlantic service inaugurated by Marconi between Clifden Station in Ireland and Glace Bay Station in Cape Breton has been in working order, with but few breakdowns. These stations were designed for a wave length of 12,000 feet, and a consequent periodicity of 82,000 vibrations per second, using a spark length of 0.5 in. to 0.8 in. The detectors now chiefly employed in the Marconi system are the Marconi magnetic form, using a revolving iron band and a modified form of the 'Fleming valve,' also devised by Marconi. The form of 'jigger' which seems to be meeting with considerable success is that form in which a heavy current is passed between two balls, between which a plate is revolved at high speed. Instead of an ordinary arc being set up, a high-frequency oscillatory current is generated between one ball and a brush pressed against one side of the revolving disc. By means of the now usual form of syntonic system, this oscillating current is employed to set up waves from the antennae.

"One of the latest improvements in the Telefunken system has been the employment of the so-called 'singing arc.' This employs a multiple spark-gap, consisting of a number of flat discs separated by a thin ring of mica. An induction coil, giving a secondary current at from 2,000 to 3,000 volts and 250 periods is employed, together with a capacity shunt. It is expected that with this apparatus it will be possible to transmit over 1,500 miles over level land or sea, with an expenditure of energy amounting to only eight kilowatts. It is also expected that it will be feasible to receive two or more different messages with one detector at the same time, owing to the tone feature of this system."

In spite of many efforts, we still seem to be far from devising any satisfactory mode of preventing the leakage of signals into the hands of those who are not intended to receive them. By means of the syntonic tuned systems now employed, it is generally possible to prevent a station from receiving messages which it does not want, but how to prevent unauthorized persons from getting messages which they deliberately set themselves out to receive has been by no means solved.

Very different in detail is the situation presented by wireless telephony, which is more and more confused in the general mind with the methods of wireless telegraphy. Although for several reasons wireless telephony is not likely soon to exceed in practical importance the practice of wireless telegraphy, some really simple and successful system of wireless telephony would possess so many obvious advantages that the advent of such a system is well worth striving for. Not the least of the advantages is that wireless telephony does not require a specially trained operator.

"A ship installation could be used by the ordinary officers as a ready means of communicating from one ship to another. Recent improvements have suggested the possibility that it is only a question of time before it will be possible to speak across the Atlantic, although whether such a possibility would be of real practical advantage is perhaps doubtful. Taken as a whole, we might say that wireless tele-

*Current Literature.

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phony has reached a stage corresponding to that reached by wireless telegraphy ten years ago, so that it readily be seen that the next year or two may see advances of a revolutionary character. Many of the problems of telegraphy and telephony are so similar that much improvement in the latter can be obtained by experience in the former.

"As the subject of wireless telephony has not been written about to nearly the same extent that the telegraphy branch has been, we may, perhaps, be pardoned for dealing with it in a rather more elementary fashion. At the present time the methods employed in wireless telephony may be divided into two distinct classes—those which depend on the remarkable effects of light on selenium, and those in which the principle employed is almost identical with those used in wireless telegraphy. The property of selenium to which we allude is that the electrical resistance of the crystalline form of this subject varies greatly according to the amount of light incident upon it. This selenium (which is a slate-gray kind of substance) has rather a high resistance in any case, and in order to use it for telephony work it is necessary to arrange it in so-called 'cells.' These consist in principle of a large number of thin slices or rings arranged 'in parallel.' Such a cell may have a resistance of, say, 1,200 ohms when in darkness, while in bright daylight the resistance would fall off to perhaps 600 ohms."

The second phenomenon necessary for a wireless telephony set is associated with the fact that an electric arc is remarkably sensitive to minute changes of current:

"So much so that if we connect an arc light in the secondary circuit of a transformer, and then by connecting up a telephone transmitter to the primary side of the transformer and speaking into the transmitter cause electrical variations in the arc circuit, these variations will be faithfully copied by variations in the light given by the arc. The rays of light from the arc are projected by a suitable mirror arrangement on to a second parabolic mirror, at the focus of which is placed the selenium cell already described. Connected in circuit with the latter is an electric battery and a telephone receiver. The cycle of operation is then obvious enough."

RADIO-TELEGRAPHY.

Wireless Telegraphy on Transports.—The British transports Soudan, Rohilla, Dongola, Rewa and Plassy have been fitted with Marconi's wireless telegraph apparatus.

Wireless in Turkey.—The Imperial Post and Telegraph Department is contemplating the erection of a wireless telegraph station at Alaschati or Karaburun, near Smyrna.

Wireless Telephony on French Battleships.—Experiments carried out by French battleships have resulted in successful conversation by wireless telephony at a distance of 72 miles.

Wireless in the Court Room.—In the suit of the Marconi Wireless Telegraph Company against the British Radiotelegraph and Telephone Company, for patent infringement, now before a London court, wireless apparatus is operated in the court room as evidence, an antenna having been erected on the flagpole of the building.

The Rev. Joseph A. Myer, pastor of the Catholic Church at Tompkinsville, Md., is erecting a wireless station near his home and church in order to keep in touch with the outside world. The nearest telegraph office is twenty-five miles away, and he is twenty miles away from the nearest railroad.

Joseph H. Reall, who represented himself as being behind a scheme to combine the Continental Wireless Telegraph Company with other similar companies, and who was charged by the postal authorities with using the mails in a scheme to defraud surrendered himself to the Federal authorities in Boston a few days ago.

Wireless in Australia.—The proposed Australian wireless station at Sydney, N. S. W., will be located on Pennant Hill. There are two private wireless stations in Sydney which have held communication with steamers 1,500 miles away. These stations, however, are not permitted to transact business of a public character.

The steamer Olympia, of the Alaska Steamship Company, was wrecked December 10 off Bligh Island, Alaska, and wireless operator Hayes sent out the distress signal "S. O. S." calling for aid. In answer to the call two government steamers and a launch were despatched from Valdez, Alaska, to the relief of the Olympia. All of the Olympia's passengers were saved by the prompt arrival of the government boats.

British Imperial Wireless Line.—Regarding the proposed British imperial wireless line, Consul-General James T. Du Bois at Singapore says that only twenty stations in all are necessary to connect the British possessions. They would cost $5,000,000 to build and about $1,000,000 annually to operate. Stations would be required at Montreal, Glace Bay, and Vancouver, Canada; Hongkong; Singapore; Perth, Adelaide, and Sydney, Australia; Wellington, New Zealand; Gibraltar; Malta; Alexandria, Egypt; Aden; Bombay; Colombo; Mombasa, Durban, Cape Town, Bathhurst, Sierra Leone, and St. Helena, Africa. The connections required would be: (1) Montreal, Canada, to Sydney, Australia, as follows: Montreal to Glace Bay, thence to Vancouver, Hongkong, Singapore, Perth, Adelaide, and Sydney. (2) England to Wellington, as follows; England to Gibraltar, thence to Malta, Alexandria, Aden, Bombay, Colombo, Singapore, Perth, Adelaide, Sydney, and Wellington. (3) England to China, by route 2 to Singapore, thence to Hongkong. (4) England to Africa, as follows: England to Gibraltar, thence to Aden, Mombasa, Durban, and Cape Town; or, England to Bathurst, thence to Sierra Leone, St. Helena, and Cape Town.

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The Military Telegrapher in the Civil War.

PART LI.

Mr. George C. Pierce, vice-president of the Old National Bank, Grand Rapids, Mich., is one of the many military telegraphers of the Civil War who have reached positions of prominence in their respective communities. Their stories of their experiences during that trying period of this country's political existence are always interesting and should be read and cherished by all telegraphers, especially those of the later generation, who cannot and do not realize what civil war means.

Mr. Pierce contributed an account of his experiences for Colonel William R. Plum's book entitled "The Military Telegraphers During the Civil War in the United States." The story reveals the dangers to which telegraph employes were exposed in the execution of their duties, and we are often surprised that they escaped with their lives under the circumstances narrated. Mr. Pierce says in part:

"September 1, 1863, found the army in the Tennessee Valley extending along the line of the Memphis and Charleston Railroad from Decatur to Shellmound, the latter being a station about nine miles this side of Running Water bridge, so called. Reynold's corps being at Shellmound, I had, under the direction of Captain Van Duzer, opened the line from Bridgeport to that point. It was reported there that General Bragg had evacuated Chattanooga. This information came from Wilder's cavalry which was operating on the bank of the Tennessee river directly opposite to our position and our scouting parties also reporting that there was no signs of the enemy on our front.

"On September 5, General Reynolds was ordered to move his forces to Running Water and establish communication with his rear by telegraph. In order to carry out this order I was directed to take four men with me and the necessary supplies and proceed along the railroad, repair the lines, etc. Starting from Shellmound about two o'clock in the afternoon of that day on a hand car with the men we found little to do. The line was in good order, and there were no obstacles to overcome. The army was marching along the highway below us and parallel with the railroad, but it was somewhat obscured from view by the intervening trees. As we found nothing to do, our progress along the railroad was much faster than that of the troops as it subsequently appeared. Meeting citizens passing along the track the information obtained from them seemed to confirm the previous reports of the non-existence of any Confederate forces, this side of Chattanooga at least, and in fancied security we moved along and in due time reached a point within one hundred and fifty feet of the bridge. Leaving the men to unload the material from the hand car, I proceeded along the track and stood upon one of the piers of the bridge, surveying the situation—the superstructure having been burned by the Confederates. I had hardly looked around me when I was startled by hearing a voice near by exclaim: 'What you all doing up there.' Turning to my right I saw, not thirty feet away from me, a Confederate cavalryman with his carbine held in a warlike position, which made me feel exceedingly uncomfortable. A glance showed that the "jig" was up with me, and I replied: 'I was just looking around.' 'Come down from there,' was a command I heard next from him and I complied promptly without any parley. By this time four more cavalrymen put in an appearance. Without much ceremony I was placed upon one of their horses and told to hang on to its rider for life, which you can be assured I did, and we started for the Confederate pickets. The squad had been out on a scouting expedition and had arrived at the bridge at the same time I did. During the ride I exchanged clothing with them, and surrendered about everything of value that I had, except $12.00 in currency, and by the time I reached the picket line I was to all appearances as much of a Confederate as any of them. We went direct to Chattanooga which was not evacuated as had been reported. There I was taken before General Bragg and he questioned me for more than an hour trying to ascertain the strength of our forces and the location of our supplies, but I managed to profess such profound ignorance upon those subjects that I was sent to the guard house. This was about midnight. The sensation of being in the hands of the enemy was strange enough, yet I cannot say that I felt bad about it. There was something novel in the situation and I supposed that I would go directly through the Confederacy to Richmond and two or three weeks would bring me around again. It is hardly necessary to say that I was much mistaken in this regard. From Chattanooga I was sent to Atlanta, and from there direct to Richmond where I remained confined on Belle Isle until the following March 7, when I was exchanged and came home. I afterwards returned to the service at Chattanooga and worked there while you and your associates marched through the country to the sea with Sherman. I left Chattanooga in 1865, and came north, remaining in Chicago until 1866, when I left the telegraph profession to engage in other business."

Copper wire has a great attraction for thieves. The American Telephone and Telegraph Company reports the stealing of some of its wire recently from a shed along the Maryland and Pennsylvania Railroad near Baltimore. All telegraph and telephone companies are reporting losses of copper wire by theft.

The Magnetic Club of St. Louis, Mo., composed of employes of the Western Union and Postal Telegraph-Cable Companies, gave a ball on November 23, which was largely attended.

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When the Postal Entered San Francisco.

BY N. F. HARRISON, OF ASHLAND, OREGON.

From the year 1877 until the early spring of 1887, the Western Union Telegraph Company had no competitor in the telegraph field on the Pacific coast. When the Atlantic and Pacific Telegraph Company was absorbed by the Western Union during the summer of 1877 very few persons thought that the telegraph business would increase to a volume that would support two transcontinental telegraph systems.

In those days the newspapers of the Pacific coast handled comparatively little news service. Now, each large daily receives many thousand words, apart from the Associated Press service. Then, the Los Angeles business was all handled on one or two Morse wires, the way business also being transacted on the same wires. Now there are several quadruplexed and duplexed circuits and they are worked to their fullest capacity.

The construction of the Pacific Postal Telegraph Company's system was begun in 1886 and during the spring of 1887 it opened its San Francisco office, the lines entering the city from the north.

The personnel of the San Francisco office at the time of opening, if my memory serves me right, was as follows: Mr. M. C. Laven, superintendent; Mr. L. W. Storror, auditor; Mr. John Leach, manager; Mr. B. C. Shearer, cashier, and Miss Anna Koster in charge of the delivery and receiving departments. The operating force consisted of Mr. T. H. Berry, night chief; Mr. Walter E. Huey; Mr. F. G. Dickinson; Mr. W. C. Swain; Mr. George W. Parsons; Mr. George Denison; Mr. W. A. Galvin; Mr. James L. Lillis and Mr. N. F. Harrison. Of this list the following have since died: M. C. Laven, John Leach, F. G. Dickinson, J. L. Lillis and Miss Koster. There are only three of the original force now working in the San Francisco office, viz.: Messrs. Wm. C. Swain, T. H. Berry and George W. Parsons. Our former general superintendent, Mr. Leonard W. Storror, is now with the Pacific States Telephone Company, and the writer of this article, who was also a member of the original force, is now manager of the Postal Telegraph-Cable Company's repeater station at Ashland, Oregon. Mr. George Denison is still with the company and is assistant chief operator at Salt Lake City, and Mr. W. E. Huey was seen in Los Angeles three or four years ago. I have lost track of Messrs. Dickinson and Galvin. Mr. B. C. Shearer is a county official at Reno, Nev.

A quarter of a century brings many changes and as we grow older it is difficult to recall either the time or the character of the changes. In those comparatively old days in our service we were accustomed to see much of our beloved president, Mr. John W. Mackay. I was all-night chief operator in the San Francisco office at the time his son, John W. Mackay, Jr., and brother of Mr. Clarence H. Mackay, now president of the company, was accidentally killed in France. I remained all that night in the office with Mr. Mackay and I recall that I accompanied him on several trips from the office to the Palace Hotel where he was stopping. On one of these Mr. Mackay stopped in front of the Grand Hotel and pointed out to me the room in which his dead son was born.

With the closing of the year 1910 the Postal Telegraph-Cable Company will have completed two new wires between San Francisco and Seattle, making a total of five wires between these points. In addition to its southern route, the company has recently completed a line of three wires on the central route between Salt Lake City and San Francisco.

Such has been the change from one wire, via New Westminster, B. C., and the Canadian Pacific Railway, in 1887, as an outlet for the eastern business, to a dozen or more wires via the southern and central routes at the close of 1910.

Mark Twain and the Telephone.

At a recent meeting of the New England Telephone Society, according to *New England Telephone Topics*, Mr. Thomas D. Lockwood, the well-known old-time telegrapher, and now general patent attorney for the American Telephone and Telegraph Company, Boston, told a funny story about an experience he had with the late Mark Twain regarding the latter's telephone. "When I had been in the telephone business about two years," said Mr. Lockwood, "Mark Twain wrote me a letter which I still have, and it read something like this:

"'I see that you have written a book, and I bought the book, and I enjoyed it and was much entertained; but after reading it through from A to izzard, I find that I know very little more about the telephone than I did at first. I have read it, in fact, with the same sort of inscrutable enjoyment with which I should read a book written in Sanscrit, knowing that there was something good there if I could only get at it. But it gave me no light upon my own special telephone problem, which is this: I want to know why the inspector of the ——— Telephone Company feels it a necessity to examine my telephone every day of the 365 in the year without fail.

"'I have formed a sort of nebular hypothesis upon it and it is this: When my telephone was first installed, the same inspector, aided by two or three linemen, came in and set it up, and I felt it my duty to set up the cake and wine, and having begun that way I felt it my duty to keep on. I have had a telephone for exactly nineteen months, and the number of bottles of sherry that I have had to use on that inspector, and the number of cakes my cook has had to bake—well, it reaches well up into infinitude.'

"I explained to him that that was not really one of the necessaries of telephone service, but he wrote me back that he didn't see his way clear to stopping it, having begun and having carried it along such a long time."

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO

J. R. TALTAVALL, - Editor and Publisher,
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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January 1, 1911.

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

The Old Year and the New.

Telegraph and Telephone Age extends the compliments of the season to its readers and friends, and wishes them a happy and prosperous New Year. In conformity with the universal custom we have turned over a new leaf for 1911 and written upon it the resolve to make Telegraph and Telephone Age more interesting and valuable to its readers than ever before, and it would please us if they would let us know from time to time how we are succeeding in our efforts.

The past year has been without doubt the most notable in the history of the telegraph in this country.

By far the most important event of the year in telegraphic circles was the merging of the Western Union Telegraph Company and the American Telephone and Telegraph Company. The telegraph administration has been reorganized to conform with the organization plan of the telephone company, and the official staff has been very largely increased. It seems to be the purpose of the new management to popularize the telegraph; as it has done the telephone, and enlarge its usefulness. The last act in the change of administration was the appointment of Mr. Theo. N. Vail as president of the Western Union Telegraph Company and the retirement of Col. R. C. Clowry from that position after a continuous service in the telegraph field of over half a century.

Mr. Vail is not a stranger to the telegraph. He was an operator in his early career and afterwards became interested in the telephone to which interests he has devoted most of his time in late years. He is an organizer and manager of the highest type, and the telegraph interests now under his direction will feel the quickening influence of his progressive mind. The retirement of Col. Clowry was attended with universal regret among telegraphers but on reflection they agreed that he was entitled to the rest which he sought.

The telegraph and telephone which have so many interests in common are now being conducted co-operatively to the great benefit of the public. The plans of the management have hardly begun to be unfolded and what they fully provide for time will reveal.

The institution of the system of message exchange between telegraph and telephone offices has passed through the experimental stage, and it seems to have met with popular approval. There is no doubt that when its advantages become more generally known it will prove of great benefit to public and company alike. The underlying principle, as practiced in all public utilities, is to encourage the people to use these facilities in the freest manner possible. Looking at the situation from a broad standpoint this system of message exchange renders it possible for a telephone subscriber, whether he be a farmer or a banker, to send a message to any part of the world without the necessity of leaving his home or desk. Thus it may be asserted that there are over five million telegraph and telephone offices in this country.

The night letter service instituted during the year has made it possible for the telegraph companies to operate their plants to well-nigh their maximum capacity. Where there is a large investment in plant it is of the highest importance to keep the plant busy during the hours when general business is closed. The night message service is bringing about this result. It gives business men additional facilities for the transaction of business and enables them to accomplish more in a given time than was possible before.

The same idea, in a somewhat modified form has been developed for application to Atlantic cable business. The American interests are agreed to the proposition; it only remains now to obtain the sanction of the European governments concerned and of the International Telegraph Bureau which must give its approval to matters affecting international

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telegraph relations before they can become effective. The proposition is to create a class of business which may be transmitted at night or at other times when the cables are not overtaxed. To secure such a class of deferred business it is proposed to accept cablegrams written in plain language at one half the present tolls, each letter to be counted and five letters to be regarded as equivalent to one word. How the proposed plan will work out in practice is perhaps a little problematical. There seems to be good reason, however, to believe that all the parties interested will agree to the main proposition.

The close alliance between the Western Union and telephone interests does not seem to have alarmed the opposition telegraph company in any way. It has on more than one occasion during the year stoutly denied that it was interested in any manner in the consolidation of the opposite interests, and has vigorously asserted that it was its intention to maintain its position of strict independence.

In this connection it is interesting to point out that the reorganization of the telegraph interests has resulted in the promotion to higher and important positions of many worthy employes of the company. That there was plenty of good material in the profession is evident from the fact that most of the promotions have been from the rank and file. There is yet much latent ability there and it will be encouraging to those who come within that class to know that the prospects of the recognition of their worth are better now than ever before.

The outlook for the new year is certainly one full of promise and prosperity for the telegraph and telephone companies and incidentally for the telegraph employes, and it is the wish of Telegraph and Telephone Age that all hopes will be realized.

Reciprocal Fidelity.

One of the greatest contributing causes of success of a business organization is the fidelity and loyalty of the individuals composing it. Antagonism has never produced harmony and never will, while loyalty, or in other words, an honest desire to work for the interest of the employer, will sooner or later be rewarded. One common mistake is to slight the duties imposed upon us and allowing indifference and dissatisfaction to creep in if the reward does not come as soon as we think it should. We forget that we must first earn the reward by diligence and fidelity to duty. Spurts of duteous action are not worth much, but the continuous "pull all together" accomplishes everything.

In order to secure the best results in an organization the individual should subordinate himself to the general cause. He should work first for his company, and give his company credit for all that pertains to the business and not take all the credit upon himself. What he has accomplished individually will be properly credited to him by others. The employe should feel that the success of the telegraph business depends upon his honesty and loyalty and upon that of others, and that if this spirit were more generally applied better conditions would prevail. On the other hand the employing companies have a serious relation toward their employes. They should encourage in every way possible honesty, fidelity and enthusiasm on the part of their employes, and reward them for good and faithful service. Many worthy employes feel that they have not received the recognition that is due them. However this may be, it should be the solemn duty of the companies to be as loyal and fair to their employes as they expect the employes to be toward them. The duty is on both sides.

Government Crusade Against Bucket Shops.

In discussing his crusade against "bucket shops," United States Attorney-General Wickersham, at Washington, advocated publicity for legitimate corporations as an assurance of prosperity and expressed favor for a properly framed federal incorporation law. "By publicity," he said, "I mean that business corporations should not conceal the records of their transactions, but should make them public and should at all times deal fairly and frankly with their stockholders and the public in general. This, in my estimation, is the best means of encouraging confidence among those who have money to invest and among those who are already stockholders. But, above all, this publicity and fair dealing would almost entirely do away with the many 'wildcat' financial schemes which have thrived in the past and which the government is endeavoring to suppress by depriving them of the use of the mails and in other ways.

"Within the last few years the American public has lost many millions of dollars through swindling operations in imaginary enterprises, bucket shops and get-rich-quick schemes generally, prompted by alluring advertisements and circulars. If the investors had had opportunity to know the real financial condition of these companies and their business methods their savings would not have been lost. Instead, their money would have been put into legitimate business corporations.

"The main difficulty has been that the investing public has been unable to distinguish, because of the secretive policy maintained by so many genuine, bona fide institutions, between the legitimate and the illegitimate ones. The former can afford to deal openly with the public, but the get-rich-quick concerns cannot.

"There is nothing which would do more to divert the investments of the country into honest enterprises than the publicity of their financial conditions and business methods. The result would necessarily mean prosperity for all concerned. A federal incorporation law properly framed would assist in bringing this about."

Electrical Exhibition in Cape Town.—It is proposed to hold an electrical exhibition in Cape Town, South Africa, in March, 1911.

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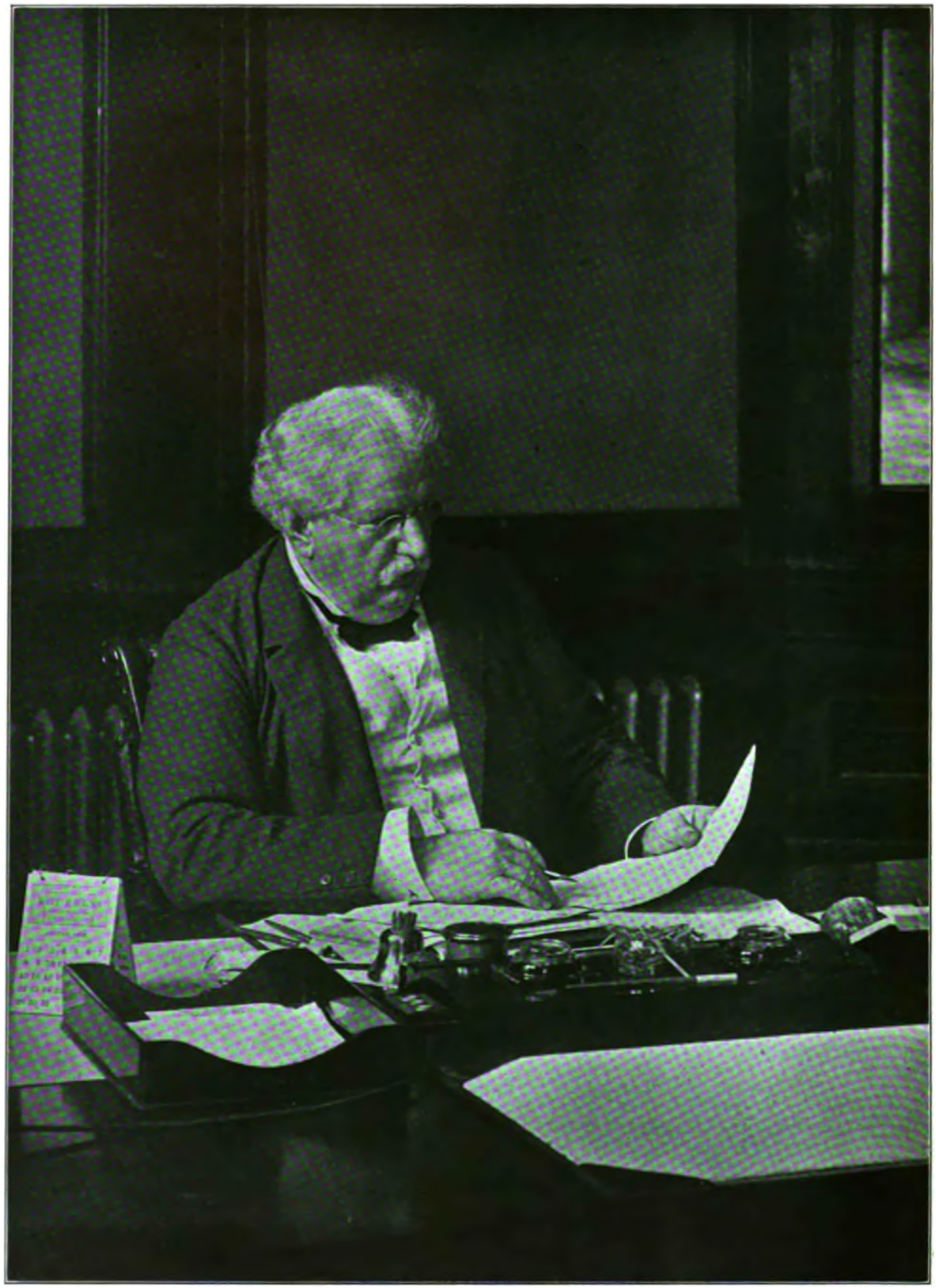

MR. THEO. N. VAIL

President of the American Telephone and Telegraph Company and President of the Western Union Telegraph Company, New York.

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Mr. Theo. N. Vail, President of the Western Union Telegraph Company.

The election of Mr. Theo. N. Vail to the presidency of the Western Union Telegraph Company brings back into the telegraph field a family name that stands second only to that of Prof. Morse in the development of the great invention for electrical transmission of intelligence. Mr. Alfred Vail, uncle of Mr. Theo. N. Vail, was the friend, partner and loyal supporter of Prof. S. F. B. Morse all through the early struggle to make the telegraph possible and practicable. Alfred Vail was the practical mechanic, designer, engineer and operator who seized upon the conception of Morse, made the instruments, and invented numerous accessories so that the system would work. He was the first operator. Prof. Morse was at one end of the wire and Vail at the other when the first telegraph message was sent in 1844—the historic phrase "What hath God wrought."

Mr. Theo. N. Vail was born in Carroll County, Ohio, July 16, 1845, where his father and mother were residing temporarily, but later they returned to Morristown, N. J., and there around the famous and now historical Speedwell Iron Works, he passed his boyhood days. It was natural that he should become interested in the telegraph. He learned early to become a proficient operator, and although it was the parental plan that he should become a physician, he soon threw aside the study of medicine for electricity and worked in the local telegraph office at Morristown, and later was manager of a Western Union branch office in New York City.

In 1866, when Mr. Vail was 21 years old, his family moved to Iowa. The Union Pacific Railroad was then in process of construction and the young man obtained a position as telegraph operator and station agent, and did duty at several small points west of Omaha. Through the friendly offices of General G. M. Dodge, chief engineer of the railroad, Mr. Vail obtained an appointment in the United States railway mail service in 1869. In seven years he was in Washington as general superintendent of the entire railway mail service, which he reorganized and improved to a high state of efficiency.

In 1878 Mr. A. G. Bell and his associates were looking for a practical man to organize and build up the telephone system, and they asked Mr. Vail to take the place. Mr. Vail took hold of the work with enthusiasm and developed the invention of Bell, as his uncle had done forty years earlier for the invention of Morse. He resigned from the government service and began work on the structure that stands to-day as the American Telephone and Telegraph Company with its associated companies. In 1889 Mr. Vail resigned from active management of the telephone company to devote his attention to personal enterprises.

In the spring of 1907 Mr. Frederick P. Fish, then president of the American Telephone and Telegraph Company, retired. The business had grown by leaps and bounds in the last decade, and the trouble was to find a man broad enough to fully grasp the magnitude of the position and solve the vastly important problems connected with its direction. The only man who measured up to the standard which the directors set was Mr. Theo. N. Vail, and he was accordingly asked to accept the trust. At first he refused. The directors were insistent however, and as he was one of their number, having always retained his position on the board, he finally yielded, and went back into the harness.

Among the many plans in Mr. Vail's mind over twenty years ago for the development of the telephone service were: Metallic circuits, underground cables, subways, long distance service, and multiple switch boards. The absorption of the various local operating companies into one organization, etc., was the ultimate combination and cooperation of the telephone and the telegraph.

When he again took up the active management of the telephone affairs Mr. Vail naturally sought to materialize and secure as soon as possible, the advantages which he knew would accrue to both companies and the public by a union of telegraph and telephone facilities and interests. This he set out to do and his efforts, as usual, met with success.

This great system of telephone and telegraph now under the direction of Mr. Vail represents a combined capital nearing the billion dollar mark, every dollar of which is represented in actual value. In fact, the physical valuation of the properties at the present time is conservatively estimated at over $85.000,000 in excess of all capital obligation.

As head of the railway mail service, as head of the great telephone system and now as head of the greatest telegraph system in the world, all of Mr. Vail's work, it will be seen, has been along one line, that of the transmission of intelligence.

The recent rapid expansion of the telegraph and the plans laid down for its development are due to Mr. Vail's initiative. All of the possibilities of a physical combination of the telegraph and telephone are being rapidly developed and the telegraph company is receiving the benefit of the highly developed organization of the telephone company, with the result that the telegraph facilities enjoyed by the public are now better than ever before. The night letter service received immediate popular approval and with the execution of other plans there is no doubt the company will enjoy a prosperity unheard of in the history of the telegraph.

Mr. Vail is without doubt the foremost telephone and telegraph man in the world to-day and it would be difficult to over-estimate the value of his vigorous and progressive policy to the great public serving institutions, the telephone and the telegraph.

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DIRECTORY OF THE TELEGRAPH AND TELEPHONE

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

WESTERN UNION TELEGRAPH COMPANY.

Executive offices, 195 Broadway, New York; incorporated 1856; capital $100,000,000; London offices, Broad Street, House, New Broad Street, E. C.

The system of this company embraces 1,429,049 miles of wire and 24,825 offices.

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FIRST DISTRICT—RICHMOND, VA.

District Commercial Supt.....J. S. Calvert
District Traffic Supt.....F. O. Nourse
District Plant Supt.....J. B. Faulkner

SECOND DISTRICT—ATLANTA, GA.

District Commercial Supt.....E. E. Williams
District Traffic Supt.....G. W. Lloyd
District Plant Supt.....W. A. Neill

THIRD DISTRICT—JACKSONVILLE, FLA.

District Commercial Supt.....L. J. Maxwell
District Traffic Supt.....J. W. Peacock
District Plant Supt.....J. C. Duane

FOURTH DISTRICT—NASHVILLE, TENN.

District Commercial Supt.....J. R. Terhune
District Traffic Supt.....W. G. Peebles
District Plant Supt.....W. K. McClarin

PACIFIC DIVISION.

Headquarters—San Francisco.

C. H. Gaunt, General Superintendent.

Division Commercial Supt.....H. F. Dodge
Division Traffic Supt.....H. C. Chace
Division Plant Supt.....R. W. Gray

FIRST DISTRICT—SAN FRANCISCO.

District Commercial Supt.....A. H. May
District Traffic Supt.....H. J. Jeffs
District Plant Supt.....G. S. Tulloch

SECOND DISTRICT—SEATTLE.

District Commercial Supt.....E. Boening
District Traffic Supt.....G. D. Hood
District Plant Supt.....E. L. Ritter

THIRD DISTRICT—LOS ANGELES.

District Commercial Supt.....Hugh McPhee
District Traffic Supt.....R. H. Miller
District Plant Supt.....L. Messner

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MOUNTAIN DIVISION.
Headquarters—Denver.
J. C. Nelson, General Superintendent.
Division Commercial Supt.....S. E. Leonard
Division Traffic Supt.....B. L. Brooks
Division Plant Supt.....R. W. Whitehead
FIRST DISTRICT—DENVER.
District Commercial Supt.....E. E. McClintock
District Traffic Supt.....Geo. R. Allen
District Plant Supt.....R. W. Whitehead
SECOND DISTRICT—SALT LAKE CITY.
District Commercial Supt.....U. G. Life
District Traffic Supt.....E. C. Labadie
District Plant Supt.....F. E. Horton
THIRD DISTRICT—OMAHA.
District Commercial Supt.....C. B. Horton
District Traffic Supt.....J. P. Barnhart
District Plant Supt.....W. Salisbury
GULF DIVISION.
Headquarters—Dallas.
L. McKisick, General Superintendent.
Division Commercial Supt.....J. C. Smith
Division Traffic Supt.....L. K. Whitcomb
Division Plant Supt.....M. B. Wyrick
Division Auditor.....J. Q. Pipkin
FIRST DISTRICT—DALLAS.
District Commercial Supt.....Norman Ringer
District Traffic Supt.....W. P. Davis
SECOND DISTRICT—NEW ORLEANS.
District Commercial Supt.....T. P. Cummings
District Traffic Supt.....H. Vandevender
THIRD DISTRICT—OKLAHOMA CITY.
District Commercial Supt.....A. R. Lingafelt
District Traffic Supt.....J. W. Brooks

THE GOLD AND STOCK TELEGRAPH COMPANY.

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

OFFICERS.

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

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

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

THE MACKAY COMPANIES.

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

TRUSTEES.

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

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

The company owns the whole or part of the capital stock of cable, telegraph and telephone companies, including the entire capital stock of the Commercial Cable Company, $23,000,000, and the various companies contributing to the Postal Telegraph system.

POSTAL TELEGRAPH-CABLE COMPANY.

Executive offices, 253 Broadway, New York; incorporated 1886.

(*See Mackay Companies.*)

BOARD OF DIRECTORS.

Albert B. Chandler, Chairman.

Clarence H. Mackay	George Clapperton
Charles R. Hosmer	Charles C. Adams
Charles P. Bruch	Edward J. Nally
George G. Ward	James W. Ellsworth
Edward C. Platt	Edward Reynolds

Clarence H. Mackay, president.

Edward J. Nally, vice-president and general manager.

Charles C. Adams, second vice-president.

Charles P. Bruch, third vice-president.

George G. Ward, fourth vice-president.

Edward C. Platt, treasurer.

Theodore L. Cuyler, assistant treasurer.

Edward Reynolds, auditor.

Welcome I. Capen, general superintendent of plant.

Isaac Smith, superintendent of tariffs.

Walter D. Francis, superintendent of supplies.

Minor M. Davis, electrical engineer.

John F. Skirrow, associate electrical engineer.

John O. Stevens, secretary.

Wm. B. Dunn, assistant secretary.

John Doran, superintendent complaint and claim department.

F. F. Norton, superintendent of traffic.

Charles Shirley, assistant superintendent of traffic.

H. W. Hetzel, traveling auditor.

Edward S. Butterfield, general agent money transfer service.

EASTERN DIVISION.

Edward B. Pillsbury, general superintendent, New York.

Leona Lemon, division superintendent, New York.

Charles H. Lane, superintendent of construction, New York.

James F. O'Donohue, division electrical engineer, New York.

DISTRICT SUPERINTENDENTS.

1. Christopher F. Leonard, New York.
2. Edson Kimmey, New York.
3. Charles E. Bagley, Philadelphia, Pa.
4. Arthur L. Edgecomb, Boston.
5. Harvey D. Reynolds, Buffalo.
6. Henry Scrivens, Pittsburg, Pa.

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WESTERN DIVISION.

Guy E. Paine, general superintendent, Chicago.

Frederick W. Conger, division superintendent, Chicago.

H. C. Shaw, division electrical engineer, Chicago.

Charles M. Baker, division general superintendent of plant, Chicago.

DISTRICT SUPERINTENDENTS.

1. Hiram G. McGill, Chicago.
2. Edgar W. Collins, Cleveland, O.
3. Solomon H. Mudge, St. Louis.
4. A. L. Lafferty, Chicago.
5. Alpheus B. Richards, Kansas City.
6. W. P. S. Hawk, Chicago.
7. W. C. Black, Denver, Colo.
8. J. F. Looney, Chicago.

SOUTHERN DIVISION.

George H. Usher, general superintendent, Atlanta, Ga.

Jesse Hargrave, division superintendent, Atlanta, Ga.

Benjamin S. Price, superintendent of construction, Atlanta, Ga.

DISTRICT SUPERINTENDENTS.

1. Charles H. Ashburn, Atlanta, Ga.
2. G. W. Ribble, Atlanta, Ga.
3. Chas. B. Arrington, Atlanta, Ga.
4. Wm. C. Daviett, Atlanta, Ga.

PACIFIC DIVISION.

Jed G. Blake, general superintendent, San Francisco, Cal.

Vail V. Stevenson, division electrical engineer, San Francisco, Cal.

J. J. Lynch, superintendent of construction, San Francisco, Cal.

DISTRICT SUPERINTENDENTS.

1. William Hearn, San Francisco, Cal.
2. John A. Forehand, Seattle, Wash.
3. Charles L. Lewis, Los Angeles, Cal.

LEGAL DEPARTMENT.

William W. Cook, general counsel, New York.

POSTAL TELEGRAPH-CABLE COMPANY OF TEXAS.

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

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

S. M. English, president and general manager.

MANAGERS AT PRINCIPAL PLACES.

Ardmore, Okla.....W. T. Salisbury
Arkansas City, Kan.....H. E. Leasure
Austin, Tex.....S. S. Scothorn
Bartlett, Tex.....M. C. Allen
Beaumont, Tex.....T. A. Darling
Belton, Tex.....Claude Cox
Bonham, Tex.....Z. H. Hartman
Chickasha, Okla.....E. Curtis
Crowley, La.....W. A. Brown
Dallas, Tex.....L. A. Ott
Denison, Tex.....H. E. Gordon
El Reno, Okla.....J. W. Jenkins
Fort Smith, Ark.....J. W. Gilliam
Ft. Worth, Tex.....A. C. Farmer
Gainesville, Tex.....H. H. Henderson
Galveston, Tex.....J. Coffer
Guthrie, Okla.....J. E. Sandford
Helena, Ark.....J. G. Faulkner
Hillsboro, Tex.....W. H. Hord
Hope, Ark.....A. P. Andrews
Hot Springs, Ark.....D. L. Edwards
Houston, Tex.....J. D. McLelland
Jennings, La.....Miss L. A. Dobrowolski
Joplin, Mo.....J. F. O'Donnell
Lake Charles, La.....C. M. Wilgus
Little Rock, Ark.....O. M. Lowe
McAlester, Okla.....R. E. Reese
McKinney, Tex.....G. D'Armand
Marshall, Tex.....D. E. Alexander
Minden, La.....J. A. Taylor
Monroe, La.....D. T. Towles
Morgan City, La.....J. L. Fisher
Mulvane, Kans.....R. P. Seyfer
Muskogee, Okla.....G. O. Pittman
New Iberia, La.....Mrs. A. V. Miller
Oklahoma City, Okla.....W. A. Logan
Orange, Tex.....M. A. Bravo
Paris, Tex.....Eugene Shulze
Pine Bluff, Ark.....G. B. Willingham
Plano, Tex.....L. T. Pellerin
Port Arthur, Tex.....Miss K. L. Polansky
San Antonio, Tex.....W. E. Herring
Shawnee, Okla.....Hugh Cathey
Sherman, Tex.....P. R. Napier
Shreveport, La.....P. H. Fennell
Tallulah, La.....N. D. Johnson
Taylor, Tex.....E. C. Matthews
Temple, Tex.....Jeff Light
Texarkana, Tex.....J. B. Prudhomme
Tioga, La.....J. A. Vandervoort
Tulsa, Okla.....E. E. Louderback
Waco, Tex.....A. G. Steele
West, Tex.....J. H. Chambliss

THE NORTH AMERICAN TELEGRAPH COMPANY.

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

OFFICERS.

H. A. Tuttle, president; A. S. Harris, vice-president and general manager; E. C. Cooke, treasurer; D. G. McIntosh, secretary.

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

MANAGERS OF PRINCIPAL OFFICES.

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

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THE AMERICAN TELEGRAPH AND CABLE COMPANY.

LEASED TO THE WESTERN UNION TELEGRAPH CO.

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

Theo. N. Vail, president; Thomas F. Clark, vice-president; J. C. Willever, secretary; A. R. Brewer, treasurer.

T. W. Goulding, European general manager.

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

ANGLO-AMERICAN TELEGRAPH COMPANY, LIMITED.

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

DIRECTORS.

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

R. C. Smith, general superintendent, St. Johns, N. F.; F. H. Nichols, acting superintendent, 8 Broad street, New York; Fred. H. Waycott, manager, Montreal.

The property of the company consists of fourteen cables, and the total length of cable embraced in this system is 9,530 miles, with divisions as follows:

First Transatlantic System—Valentia, Ireland, to Bay Bulls, Newfoundland, laid in 1858; Valentia to Heart's Content, Newfoundland, laid in 1865; Valentia to Heart's Content, laid in 1866; Brest, France, to St. Pierre, laid in 1869; (these four cables have since been abandoned). Valentia, Ireland, to Heart's Content, 1,881 miles, laid in 1873; Valentia, Ireland, to Heart's Content, 1,890 miles, laid in 1874; Valentia to Heart's Content, 1,877 miles, laid in 1880; Valentia to Heart's Content, 1,847 miles, laid in 1894.

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

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

CENTRAL AND SOUTH AMERICAN TELEGRAPH COMPANY.

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

OFFICERS.

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

DIRECTORS.

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

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

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

This system embraces 11,693 nautical miles, with divisions as follows: First Atlantic sytem—Vera Cruz, Mexico, to Coatzacoalco, Mexico, 131 miles, laid in 1881; duplicated 142 miles, laid in 1889. Second Atlantic system—Salina Cruz, Mexico, to San Jose, Guatemala, 346 miles, laid in 1882 and 1893; San Jose to La Libertad, Salvador, 141 miles, laid in 1883 and 1893; La Libertad to San Juan del Sur, Nicaragua, 279 miles, laid in 1882; San Juan del Sur to Panama, Republic of Panama, 718 miles, laid in 1882; Panama to Buenaventura, Colombia, 413 miles, laid in 1882; Buenaventura to St. Elena, Ecuador, 543 miles, laid in 1882; St. Elena to Payta, Peru, 239 miles, laid in 1882, Payta to Chorillos, Peru, 553 miles, laid in 1882; Chorillos, Peru, to Callao, Peru, 20 miles, laid in 1891; Chorillos to Iquique, Chile, 747 miles, laid in 1891; Iquique to Valparaiso, Chile, 906 miles, laid in 1891; Salina Cruz, Mexico, to San Juan del Sur, Nicaragua, 600 miles, laid in 1893; San Juan del Sur to St. Elena, Ecuador, 1,034 miles, laid in 1893; St. Elena to Chorillos, Peru, 831 miles, laid in 1893; Iquique, Chile, to Chorillos, Peru (duplicate cable), 774 miles, laid in 1906; Iquique to Valparaiso, Chile, 903 nautical miles, laid in 1906; New York to Guantanamo, Cuba, 1,464 miles, laid in 1907; Guantanamo to Colon, Panama, 782 miles, laid in 1907; also 1,792 miles of land lines, including line from Valparaiso, Chile, to Buenos Aires, Argentina.

The company has recently purchased a site in the heart of the business section of Buenos Aires, opposite its present offices, on which it proposes to erect a modern building for its use, probably of steel and concrete.

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COMMERCIAL CABLE COMPANY.

Executive offices, 253 Broadway, New York; London office, Bishopsgate House, E. C.; organized 1883. (See Mackay Companies.)

DIRECTORS.

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

OFFICERS.

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

Manager in England, Frederick Ward.

SUPERINTENDENTS.

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

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

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

The total length of cable embraced in this system is 16,241 nautical miles, with divisions as follows:

Waterville, Ireland, to St. Johns, Newfoundland, 1,796 miles, laid to Canso, Nova Scotia, in 1884, diverted in 1909; Waterville to St. Johns, 1,859 miles, laid to Canso, in 1884, diverted in 1909; Waterville to Canso, Nova Scotia, 2,161 miles, laid in 1894; Canso to Horta, Fayal, Azores Islands, 1,698 miles, laid in 1900; Waterville, Ireland, to Canso, Nova Scotia, 2,238 miles, laid in 1905; Canso to New York, 840 miles, laid in 1884; Canso to New York, 895 miles, laid in 1900; Canso to Rockport, Mass., 512 miles (twin core), laid in 1884; Canso to St. Johns, 566 miles, laid in 1909; St. Johns to New York, 1,306 miles, laid in 1909; Havre, France, to Waterville, Ireland, 510 miles, laid in 1885; Waterville to Weston-super-Mare, near Bristol, England, 328 miles (twin core), laid in 1885; Waterville to Weston-super-Mare, 327 miles, laid in 1901; Waterville to Weston-super-Mare, 334 miles, laid in 1910; Waterville to Horta, Fayal, Azores Islands, 1,205 miles, laid in 1901.

COMMERCIAL CABLE COMPANY OF CUBA.

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

(*See Mackay Companies.*)

OFFICERS.

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

John W. Lawson, superintendent, Havana, Cuba.

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

COMMERCIAL PACIFIC CABLE COMPANY.

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

(*See Mackay Companies.*)

OFFICERS.

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

SUPERINTENDENTS.

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

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

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

COMPAGNIE FRANCAISE DES CABLES TELEGRAPHIQUES.

Executive offices, 38 Avenue de l'Opera, Paris; organized 1894; capital 63,000,000 francs ($12,600,000). M. E. Jeramec, president; W. W. Howell, representative; New York office, 25 Broad street. Louis A. Lurienne, representative, United States and Canada; E. C. Sweeney, superintendent.

Other offices: London—2 Mincing Lane, New Bridge street, E. C., Baltic Mercantile and Shipping Exchange, E. C., 24 Southwarth street, S. E., 36 Victoria street, Westminster. Havre—40 Rue de Chilou; Brest—30-32 Rue de Chateau; Antwerp—Agency, 14 Rue Venus; St. Pierre, Miquelon; New York—Pulitzer Building, Park Row, 3 Mercer street, 1 Worth street, 581 Broadway, 65 Fifth avenue, 281 Fifth avenue; Orleans, Mass., Hugh Osborne, superintendent.

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

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

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

(All cables in "italics" are now controlled by the Venezuelan government.)

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

CUBA SUBMARINE TELEGRAPH COMPANY, LIMITED.

Executive offices, 58 Old Broad street, E. C., London, England; incorporated in 1870; capital £220,000.

DIRECTORS.

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

This system embraces a length of 1,143 nautical miles, with divisions as follows: Batabano, Cuba, to Cienfuegos, Cuba, 139 miles, laid in 1891; Batabano to Cienfuegos, Cuba, 137 miles, laid in 1895; Cienfuegos to Santiago, Cuba, 393 miles, laid in 1904; Cienfuegos to Casilda, 40 miles, laid in 1895; Casilda to Tunas, 28 miles, laid in 1895; Tunas to Jucaro, 46 miles, laid in 1895; Jucaro to Santa Cruz, 81 miles, laid in 1895; Santa Cruz to Manzanillo, 59 miles, laid in 1895; Manzanillo to Cape Cruz, 81 miles, laid in 1897; Cape Cruz to Santiago, 139 miles, laid in 1897.

DEUTSCH-ATLANTISCHE TELEGRAPHEN GESELLSCHAFT.

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

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

This system embraces a total length of 9,660 nautical miles of cable, with divisions as follows: Borkum, Germany, to Horta, Azores, 1,888 miles, laid in 1900; Horta, to Coney Island, New York, 2,302 miles, laid in 1900; Borkum to Horta, 1,960 miles, laid in 1903; Horta to Coney Island, 2,357 miles, laid in 1904; Borkum to Vigo, Spain, (purchased by this company in 1905), 1,153 mlies, laid in 1896.

THE DIRECT UNITED STATES CABLE COMPANY, LIMITED.

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

DIRECTORS.

E. M. Underdown, chairman; Hon. Thomas H. A. E. Cochrane, C. E. Gunther, Sir James Pender, John Varley, H. C. B. Underdown; Wm. Miles, secretary; S. Fenn, manager.

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

SUPERINTENDENTS.

F. J. Macbeth, London, England; J. H. Beswick, Liverpool, England; Ballinskelligs cable station, Ireland (position vacant at present); C. H. Macbeth, Glasgow, Scotland; John F. Fraser, superintendent, and T. H. Chapman, assistant, Halifax, N. S.; W. J. Fraser, Boston, Mass., and Rye Beach, N. H.; P. W. Rieb, assistant, Rye Beach, N. H.; Clement Lee and J. N. Weisiger, assistants, New York.

PRINCIPAL OFFICES.

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

Boston, 31 Devonshire street.

Halifax, N. S., 48 Bedford Row.

Glasgow, 4 Waterloo street.

Bristol, Black Hall Chambers, Baldwin street.

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

Liverpool, D 6, Exchange Buildings.

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DIRECT WEST INDIA CABLE COMPANY, LIMITED.

Executive offices, 33 Old Broad street, London, E. C.; organized 1897; authorized capital, £120,000 ($600,000). Issued £60,000 in shares of £5 each with £2.10.0 per share called up.

Debentures £120,000. Redeemed to date £87,500, leaving outstanding £32,500.

TRUSTEES FOR DEBENTURE HOLDERS.

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

DIRECTORS.

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

The total length of cable is 1,275 nautical miles, with sections as follows: Bermuda to Turk's Island, 824 miles, Turk's Island to Kingston, Jamaica, 451 miles; both laid in 1898.

HALIFAX AND BERMUDA CABLE COMPANY.

Executive office, 33 Old Broad street, London; capital £50,000 ($250,000), in fully paid shares of £5 each; debentures £120,000, all paid off.

DIRECTORS.

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

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

INTERNATIONAL OCEAN TELEGRAPH COMPANY.

Capital $3,000,000.

LEASED TO THE WESTERN UNION TELEGRAPH CO.

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

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

THE MARTHA'S VINEYARD TELEGRAPH COMPANY, INC.

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

DIRECTORS.

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

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

The system was built by the Government in 1885, and purchased from it in 1900 and connects with the Marconi wireless station at Siasconset, Mass.

MEXICAN TELEGRAPH COMPANY.

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

OFFICERS.

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

DIRECTORS.

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

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

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

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

PACIFIC CABLE.

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

BOARD OF CONTROL.

Sir Henry W. Primrose, K. C. B., chairman; J. W. Cawston, treasury, and W. H. Mercer, C. M. G., crown agent for the colonies, representing the Imperial Government; Rt. Hon. Lord Strathcona and Mount Royal, G. C. M. G., High Commissioner for Canada, and Alexander Lang, representing the Government of the Dominion of Canada; T. A. Coghlan, I. S. O., agent general for New South Wales, and Rt. Hon. Sir G. H. Reid, P. C., K. C. M. G., High Commissioner for Australia, representing the Commonweath of Australia; Hon. Sir W. Hall-Jones, K. C. M. G., High Commissioner for New Zealand, representing New Zealand.

SUPERINTENDENTS.

C. L. Hertslet, Suva, Fiji; D. Cuthbert, Norfolk Island; A. J. Godwin (acting), Bamfield, B. C.; A. Smith, Doubtless Bay; T. C. Judd, Southport; R. G. McLachlan, Montreal; W. Bent, Fanning Island; W. E. Reichenheim, officer in charge, Sydney, N. S. W.

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

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

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

Miles of aerial lines:

United States	132.5
Alaska	1,363
Philippine Islands	34
Total	1,529.5

Miles of Cables:

Washington-Alaska system	2,629.35
Philippine Islands	10.2
Total	2,639.55

Cableships:

"Burnside," Seattle, Wash.
"Cyrus W. Field," New York.
"Joseph Henry," New York.

The mileage of aerial lines and cables given herewith does not include the lines in the Philippine Islands transferred to the Insular Government by the Signal Corps in 1907 and 1910. These comprised 3,582 miles of land lines and 1,310.5 miles of cable.

LAND LINES IN THE UNITED STATES.

From—	To—	Miles.
Huachuca, Ariz.	Lewis Springs	19.0
Holbrook, Ariz.	Fort Apache	92.0
Fort Myer, Va.	Ft. Washington, Md.	21.5
Fort Clark, Tex.	Spofford Junction	9.5
Total		142.0

OFFICES WASHINGTON-ALASKA MILITARY CABLE AND TELEGRAPH SYSTEM.

Land lines, St. Michael-Valdez.	Intermediate. Miles	Total Miles.
St. Michael	0	0
Golsova	35	35
Unalakleet	30	65
Old Woman	50	115
Kaltag	45	160
Nulato	40	200
Koyukuk	30	230
Louden	50	280
Melozi	35	315
Kokrines	38	353
Birches	40	393
Fort Gibbon	55	448
Rapids	24	472
Rampart	23	495
Glen	35	530
Hot Springs	21	551
Tolovana	37	588
Minto	39	627
Nenana	35	662
Chena	29	691
Fairbanks	10	701
Salcha	37	738
Delta	29	767
Richardson	2	769
McCarty	20	789
Donnely	36	825
McCollum	37	862
Paxson	18	880
Bogan	30	910
Gulkana	30	940
Copper Center	25	965
Tonsina	25	990
Teikhell	24	1,014
Saina	24	1,038
Wortmans	12	1,050
Valdez	18	1,068
Nome-Fort Davis.		
Nome	0	1,068
Fort Davis	4	1,072
Gulkana-Fort Egbert.		
Gulkana	0	1,072
Chistochina	40	1,112
Arentasia	46	1,158
Tanana Crossing	51	1,209
Ketchumstock	55	1,264
Fort Egbert	87	1,351
Boundary (no station)	12	1,363

Cables. Seattle-Seward.	Intermediate. Miles	Total Miles
Seattle	0	0
Sitka	1,085	1,085
Valdez	599	1,684
Fort Liscum	4	1,688
Seward	196	1,884
Montague Island-Cordova-Cape Whitshed	68	1,952
Sitka-Skagway.		
Sitka	0	1,952
Cape Fanshaw (no station)	211	2,163
Juneau	98	2,261
Haines Mission	106	2,370
Skagway	18	2,385
Juneau-Douglas	3	2,388
Cape Fanshaw-Ketchikan.		
Cape Fanshaw (no station)	0	2,388
Wrangell	74	2,462
Ketchikan	113	2,575
Lawton-Worden.		
Fort Lawton	0	2,575
Fort Worden	42	2,617
Ward-Lawton.		
Fort Ward	0	2,617
Fort Lawton	12	2,629
Sitka-Japonski Island.		
Sitka	0	2,629
Japonski Island	.35	2,629.35

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Wireless.	Miles.
Egbert-Circle	107
Circle-Fairbanks	130
Fairbanks-Gibbon	130
Gibbon-Nome	330
Nome-St. Michael	127
St. Michael-Kotlish	80
Petersburg-Wrangell	30
Total	934

Recapitulation.

Land lines (double wire)	204
Land lines (single wire)	1,159
Wireless	854
Cables	2,592.35
Total	4,809.35

WIRELESS STATIONS, UNITED STATES ARMY.

Station	Call.	Power k.w.
Fort Andrews, Mass.	FC	1
Fort H. G. Wright, N. Y.	FW	1
Fort Hancock, N. J.	FN	1
Fort Leavenworth, Kan.	FL	3
Fort Levett, Maine	FV	1
Fort Monroe, Va.	FO	1
Fort Omaha, Neb.	FS	3
Presidio, San Francisco	PS	1
Fort Riley, Kan.	FZ	3
Fort Totten, N. Y.	FT	¼
Fort Wood, N. Y.	FD	3
Fort Worden, Wash.	FX	1
S. C. Laboratory, Wash., D. C.	SC	3
Fort Stevens, Oregon	FJ	1
Bureau of Standards	BS	2
ALASKA.		
Circle City	FK	3
Fort Egbert	FQ	3
Fairbanks	FB	3
Fort Gibbon	FG	10
Mouth of Yukon	FE	1
Nome	FD	10
Petersburg	FP	1
Fort St. Michael	FM	3
Wrangell	FW	1
PHILIPPINE ISLANDS.		
Manila, P. I.	PN	1
Corregidor Island	FH	10
Fort Frank	PIA	⅛
Fort Drumm	PIB	⅛
Fort Wint	PIC	1
Fort William McKinley	PID	¼
U. S. ARMY TRANSPORT SERVICE.		
Kilpatrick	ATK	3
Logan	ATL	3
Sherman	ATR	3
Sheridan	ATS	3
Thomas	ATU	3
Sumner	ATH	3
Dix	ATD	2
Buford	ATB	2
Cableship Burnside	BS	3
Cableship Joseph Henry	FR	2
Cableship C. W. Field	FA	1
ARTILLERY HARBOR TUGS.		
Reno	X	½
Captain Rowell	RW	⅛
General Randall	OR	⅛
General R. B. Ayres	FY	⅛
Harvey Brown	HB	½

UNITED STATES AND HAYTI TELEGRAPH AND CABLE COMPANY.

Executive offices, 25 Broad street, New York.

OFFICERS.

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

DIRECTORS.

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

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

WEST INDIA AND PANAMA TELEGRAPH COMPANY, LIMITED.

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

DIRECTORS.

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

This system embraces a total length of 4,355 knots of cable, with divisions as follows: Santiago, Cuba, to Holland Bay, Jamaica (No. 1), 160 miles, laid in 1870; Santiago, Cuba, to Holland Bay, Jamaica (No. 2), 156 miles, laid in 1878; Kingston, Jamaica, to Colon, Panama, 630 miles, laid in 1870; Holland Bay to St. Juan, Porto Rico, 683 miles, laid in 1870; St. Juan to St. Thomas, 72 miles, laid in 1871; Holland Bay to Ponce, Porto Rico, 647 miles, laid in 1874; Ponce to St. Croix, 135 miles, laid in 1875; St. Croix to St. Thomas, 48 miles, laid in 1875; St. Croix to St. Lucia, 344 miles, laid in 1898; St. Thomas to St. Kitts, 161 miles, laid in 1871; St. Kitts to Antigua, 49 miles, laid in 1871; Antigua to Basse-Terre, Guadeloupe, 73 miles, laid in 1871; Basse-Terre to Dominica, 51 miles, laid in 1871; Dominica to St. Lucia, 109 miles, laid in 1871 and 1907; St. Lucia to St. Vincent, 58 miles, laid in 1871; St. Lucia to Grenada, 154 miles, laid in 1898; St. Vincent to Barbadoes (No. 1), 99 miles, laid in 1871; St. Vincent to Barbadoes (No. 2), 94 miles, laid in 1890; St. Vincent to Grenada, 84 miles, laid in 1871; Grenada to Trinidad (No. 1), 89 miles, laid in 1871; Grenada to Trinidad (No. 2), 125 miles, laid in 1898; Trinidad to Demerara (No. 2), 344 miles, laid in 1891. The system also includes 212 miles of land lines.

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LA COMPAGNIE DE TELEGRAPHIE SANS FIL.

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

DIRECTORS.

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

LA COMPAGNIE FRANCAISE MARITIME ET COLONIALE DE TELEGRAPHIE SANS FIL.

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

DIRECTORS.

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

Marquis L. Solari, 74 Piazza S. Silvestro, Rome, Italy. Branch of London Marconi International Marine Communication Company, Limited.

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

The property of the various affiliated companies of the Marconi system consists of 43 stations on the Atlantic Coast and on the Gulf of St. Lawrence; 37 in Great Britain and Ireland; 37 in Europe; 5 in Brazil; 3 in Chile; 3 in China; 2 in Egypt; 1 in Gibraltar; 5 in the Hawaiian Islands; 1 in Malta; 2 in Mozambique; 1 in Uruguay; 1 in Argentina; 1 in Arabia; 1 in Cocos Island. There are over 400 steamers and steam yachts fitted with the Marconi system. In addition to these, ships of the navies of the following countries are likewise fitted: Great Britain, United States, Italy, Brazil, Canada and the Argentine Republic.

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

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

DIRECTORS.

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

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA.

Executive offices, 27 William street, New York; capital $1,662,500; incorporated 1899.

OFFICERS.

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

MARCONI WIRELESS TELEGRAPH COMPANY OF CANADA, LIMITED.

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

DIRECTORS.

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

MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED.

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

DIRECTORS.

G. Marconi, chairman and joint managing ditor; Godfrey C. Isaacs, joint managing director; Col. Sir Charles Euan-Smith, K. C. B. &c.; Samuel Geoghegan, Hammersley Heenan, Major S. Flood Page, Henry S. Saunders, H. Rial Sankey, Alfonso Marconi, Henry W. Allen, secretary.

MARCONI INTERNATIONAL MARINE COMMUNICATION COMPANY, LIMITED.

Executive offices, Watergate House, York Buildings, Adelphi, London, W. C., England; capital, £750,000.

DIRECTORS.

G. Marconi, joint managing director; Godfrey, C. Isaacs, joint managing director; Major S. Flood Page, Henry S. Saunders, Sir Charles Euan-Smith, Charles Roux, Edgar St. Paul de Sincay, H. Jameson Davis, H. Rial Sankey, Alphonso Marconi.

MARINE TRANSMISSION COMPANY.

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

Incorporated in New Jersey, 1904. Equipment consists of 26 boat installations, 8 land stations.

OFFICERS AND DIRECTORS.

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

MASSIE WIRELESS TELEGRAPH COMPANY.

(Manufacturing and holding company.)

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

OFFICERS AND DIRECTORS.

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

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THE TELEFUNKEN WIRELESS TELEGRAPH COMPANY OF THE UNITED STATES.

American Licensee of Gesellschaft für drahtlose Telegraphie, m. b. H. (Telefunken System), Berlin, Germany.

111 Broadway, New York. Branches in all parts of the world.

German Ship Stations increased to 226.
U. S. Ship Stations increased to 52.
U. S. Shore Stations increased to 35.
U. S. Wagon Stations increased to 3.
Brazilian Land Stations increased to 7.
Brazilian Ship Stations increased to 8.

UNITED WIRELESS TELEGRAPH COMPANY.

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

The company maintains 28 land stations along the Atlantic and Gulf Coasts from Eastport, Me., to Galveston, Tex.; 14 land stations on the Pacific Coast from Alaska to Southern California, and 17 land stations on the Great Lakes, extending from Buffalo, N. Y., on the east to Chicago, Ill., and Duluth, Minn., on the west.

In the North and South Atlantic and West Indian waters 180 trading vessels are equipped and operated; on the Pacific Ocean 100 vessels, and on the Great Lakes 69 vessels.

Officers—C. C. Wilson, president; C. C. Galbraith and Fredk. I. J. Hanson, vice-presidents; Cloyd Marshall, secretary and purchasing agent; W. A. Diboll, treasurer; E. P. Davis, assistant secretary and assistant purchasing agent; L. C. Wallace, assistant treasurer.

Directors—C. C. Wilson, C. C. Galbraith, Cloyd Marshall, E. P. Davis and L. C. Wallace, New York; F. I. J. Hanson, Philadelphia, Pa.; W. A. Diboll, Denver, Col.; G. Ross Eshleman, Lancaster, Pa.; Geo. H. Parker, Seattle, Wash.; Rev. D. J. Starr, Columbus, Ohio; and Wm. H. Sargeant, Portland, Me.

Executive Committee—C. C. Galbraith, C. C. Wilson, W. A. Diboll, Cloyd Marshall, secretary.

Operating Dept.—C. C. Galbraith, general manager, New York. Atlantic and Gulf Division: H. J. Hughes, superintendent, New York. Great Lakes and Northern Division: F. C. Newton, superintendent, Schofield Building, Cleveland, Ohio. Pacific Coast and Western Division: R. H. Armstrong, manager, Grand Trunk Wharf, Seattle, Wash.

Foreign Offices—London, England, Lennox House, Norfolk street, Strand, W. C.; Shanghai, China; Keegan and Rosencrantz, Asiatic agents.

Engineering and Manufacturing Departments—Harry Shoemaker, chief engineer; C. D. Babcock, general superintendent of factories.

AMERICAN TELEPHONE AND TELEGRAPH COMPANY AND ASSOCIATED COMPANIES.

LIST OF OFFICERS.

American Telephone and Telegraph Company.

Theo. N. Vail, president; Union N. Bethell, William R. Driver, Edward J. Hall, Bernard E. Sunny, Harry B. Thayer, Charles P. Ware, vice-presidents; William R. Driver, treasurer; Charles E. Hubbard, secretary; Charles G. DuBois, comptroller; John J. Carty, chief engineer.

American Bell Telephone Company, Boston, Mass.

Theo. N. Vail, president; William R. Driver, treasurer; Charles E. Hubbard, clerk; Robert W. Devonshire, general manager.

Bell Telephone Company of Missouri, St. Louis, Mo.

Charles S. Gleed, president; Edwards Whitaker, vice-president; Fritz Nisbet, secretary and treasurer; Francis L. Gilman, general manager; James K. Wass, auditor; J. F. Bratney, chief engineer.

Bell Telephone Company of Pennsylvania, Philadelphia, Pa.

Union N. Bethell, president; Frank H. Bethell, vice-president; Winfield S. Peirsol, secretary and treasurer; Philip L. Spalding, general manager; Martin H. Buehler, auditor; Nathan Hayward, chief engineer.

Central District and Printing Telegraph Company, Pittsburg, Pa.

Union N. Bethell, president; Frank H. Bethell, vice-president; Winfield S. Peirsol, secretary and treasurer; Philip L. Spalding, general manager; Martin H. Buehler, auditor, Nathan Hayward, chief engineer.

Central Union Telephone Company, Indianapolis, Ind.

Louis G. Richardson, president; Horace F. Hill, first vice-president; John Uprichard, second vice-president; William S. Chapman, secretary and treasurer; Horace F. Hill, general manager; Edward H. Bangs, chief engineer.

Chesapeake and Potomac Telephone Company, Washington, D. C.

Union N. Bethell, president; Frank H. Bethell, vice-president; Winfield S. Peirsol, secretary and treasurer; Philip L. Spalding, general manager; Martin H. Buehler, auditor; Nathan Hayward, chief engineer.

Chicago Telephone Company, Chicago, Ills.

Bernard E. Sunny, president; Byron L. Smith, first vice-president; Angus S. Hibbard, second vice-president and general manager; Charles E. Mosley, secretary and treasurer; Benjamin S. Garvey, auditor; J. G. Wray, chief engineer.

Cincinnati and Suburban Bell Telephone Company, Cincinnati, Ohio.

John Kilgour, president; Bayard L. Kilgour, vice-president and general manager; W. A. Blanchard, treasurer; Volney Elstun, secretary and auditor.

Cleveland Telephone Company, Cleveland, Ohio.

Louis G. Richardson, president; John Balch, vice-president; Alexander H. Kirkwood, treasurer;

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Charles A. Grant, secretary; Peter Yensen, general manager; John Uprichard, auditor; Edward H. Bangs, chief engineer.

Colorado Telephone Company, Denver, Col.

Edward B. Field, president; Edward B. Field, Jr., vice-president and treasurer; J. E. Macdonald, secretary; E. M. Burgess, general manager; Roderick Reid, auditor; G. E. McCarn, chief engineer.

Cumberland Telephone and Telegraph Company, Nashville, Tenn.

James E. Caldwell, president; W. W. Berry, William Litterer, Alonzo G. Sharp, vice-presidents; T. D. Webb, treasurer; John W. Hunter, Jr., secretary; Leland Hume, general manager; H. Blair Smith, auditor.

Iowa Telephone Company, Des Moines, Iowa.

Casper E. Yost, president; George E. McFarland, vice-president and general manager; James B. Mason, secretary and treasurer; Emil Palm, auditor.

Michigan State Telephone Company, Detroit, Mich.

N. C. Kingsbury, president; Dudley E. Waters, vice president; Bernard W. Trafford, vice-president and general manager; W. L. Burrows, treasurer; Walter I. Mizner, secretary; H. J. Booth, auditor; C. L. Boyce, engineer.

Missouri and Kansas Telephone Company, Kansas City, Mo.

Charles S. Gleed, president; Sherman R. Hall, vice-president; Herman F. Lang, secretary and treasurer; Francis L. Gilman, general manager; Edward F. Webster, auditor; Walter O. Pennell, engineer.

Nebraska Telephone Company, Omaha, Neb.

Casper E. Yost, president; C. W. Lyman, vice-president; E. M. Morsman, secretary and treasurer; George E. McFarland, general manager; W. A. Pixley, auditor; A. S. Rogers, engineer.

New England Telephone and Telegraph Company, Boston, Mass.

Jasper N. Keller, president; Henry S. Hyde, vice-president; Francis A. Houston, vice-president and general manager; William R. Driver, treasurer; Edmund W. Longley, secretary and auditor; George K. Manson, engineer.

New York Telephone Company, New York City.

Union N. Bethell, president; John H. Cahill, vice-president; Howard F. Thurber, vice-president and general manager; Ford Huntington, treasurer; Waldron Hoppins, secretary; Walter Brown, auditor; R. M. Ferris, chief engineer.

Northwestern Telephone Exchange Company, Minneapolis, Minn.

Casper E. Yost, president; Charles P. Wainman, John Balch, vice-presidents; J. W. Christie, treasurer; Charles A. Grant, secretary; George E. McFarland, general manager; William R. Overmire, auditor; Benjamin Waller, engineer.

Pacific Telephone and Telegraph Company, San Francisco, Cal.

Henry T. Scott, president; Edgar C. Bradley, vice-president and general manager; Emile J. Zimmer and Louis Glass, vice-presidents; Frederick W. Eaton, secretary and treasurer; Frank C. Phelps, auditor; Charles W. Burkett, chief engineer.

Pioneer Telephone and Telegraph Company, Oklahoma City, Okla.

Eugene D. Nims, president; John M. Noble, vice-president and general manager; Emery E. Westervelt, secretary and treasurer; Arthur Whorton, auditor; James F. Noble, engineer.

Providence Telephone Company, Providence, R. I.

Dexter B. Potter, president; Fenner H. Peckham, vice-president; Charles T. Howard, secretary and treasurer; Joseph F. Beck, general manager; John T. Frankenburg, engineer.

Rocky Mountain Bell Telephone Company, Salt Lake City, Utah.

H. Vance Lane, president; William S. McCormick, vice-president and treasurer; Robert B. Harkness, secretary; P. R. Ferguson, auditor; A. S. Peters, chief engineer.

Southern Bell Telephone and Telegraph Company, Atlanta, Ga.

William T. Gentry, president; J. Epps Brown, vice-president and general manager; John H. B. Hoxsey, vice-president; Addison Maupin, secretary and treasurer; C. J. Holditch, auditor; George J. Yundt, chief engineer.

Southern New England Telephone Company, New Haven, Conn.

John W. Alling, president; James T. Moran, vice-president; Andrew H. Embler, secretary and treasurer; Henry H. Sykes, general manager; Edward H. Everit, engineer.

Southwestern Telegraph and Telephone Company, Dallas, Tex.

Heman J. Pettengill, president; Joseph E. Farnsworth, vice-president and general manager; John Balch, vice-president and treasurer; Charles A. Grant, secretary; Frederick E. Bedlow, auditor; Frederick W. Yensen, chief engineer.

Wisconsin Telephone Company, Milwaukee, Wis.

Alonzo Burt, president; John Balch, vice-president and treasurer; Charles A. Grant, secretary; Henry O. Seymour, general manager; O. B. Koepke, auditor; W. R. McGovern, chief engineer.

Western Telephone and Telegraph Company.

Theo. N. Vail, president; Edward J. Hall and Charles P. Ware, vice-presidents; William R. Driver, treasurer; Charles G. DuBois, auditor.

Bell Telephone Company of Canada, Ltd., Montreal, Canada.

Charles F. Sise, president; Robert Mackay, vice-president; William G. Slack, treasurer; W. H. Black, secretary; L. B. McFarlane, general manager; James A. Baylis, engineer.

Philadelphia Electrical Exhibition.—An electrical exhibition will be held in Philadelphia, February 19-25. Special attention will be given to the decorations of the hall. The telegraph and the telephone will be adequately represented.

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THE CANADIAN PACIFIC RAILWAY COMPANY'S TELEGRAPH.

Executive offices, Hospital and St. Francois Xavier streets, Montreal, Que.; incorporated in 1881. The property of this department consists in 12,250 miles of poles and cables, and 76,100 miles of wire.

OFFICERS.

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

CONSTRUCTION AND INSPECTION STAFF.

D. Mersereau, St. John, N. B., superintendent of construction; A. J. Grant, Montreal, superintendent of construction; J. Mitchell, Montreal, inspector; S. Elliott, Montreal, inspector; E. A. Spear, superintendent of construction, Toronto; F. C. Robertson, Toronto, inspector; A. Allen, Sudbury, Ont., superintendent of construction; D. C. Coons, Winnipeg, inspector; E. M. Payne, Winnipeg, inspector; A. C. Fraser, Moosejaw, Sask. inspector; C. H. Powell, Calgary, inspector; H. McIntyre, Vancouver, B. C., inspector; F. E. J. Camp, inspector, Revelstoke, B. C.

MANAGERS AND PRINCIPAL OFFICES.

Sydney, N. S.—A. P. Anderson.
Hazel Hill, N. S. (Cable Station).—D. Blehr.
Halifax, N. S.—W. M. Godsoe.
St. John, N. B.—J. M. Barnes.
Quebec, Que.—J. F. N. Caisse.
Montreal, Que.—A. Walsh.
H. Bott, chief operator.
Ottawa, Ont.—W. T. Robinson.
J. C. Cooney, chief operator.
Toronto, Ont.—H. A. Shambrook.
H. J. Lillie, chief operator.
Hamilton, Ont.—C. J. Jones.
London, Ont.—D. H. Bowen.
North Bay, Ont.—W. S. Metzler.
Sudbury, Ont.—C. W. McMillan, circuit manager.
Sault Ste. Marie, Ont.—John Frezell.
Sault Ste. Marie, Mich.—W. J. Atchison.
Fort William, Ont.—W. Graham, circuit manager.
Port Arthur, Ont.—W. Montgomery.
Winnipeg, Man.—W. Rutherford.
W. J. Kane, chief operator.
Brandon, Man.—S. W. Brown.
Regina, Sask.—W. M. Kennedy.
Moosejaw, Sask.—D. W. Gibson.
Saskatoon, Sask.—S. Skattebol.
Swift Current, Sask.—S. M. Thurston, circuit manager.
Calgary, Alta.—J. T. Fitzgerald.
J. J. Schetgen, chief operator.
Edmonton, Alta.—D. H. Barclay.
Revelstoke, B. C.—J. L. Smith, circuit manager.
Nelson, B. C.—W. B. Shaw.
New Westminster, B. C.—H. A. Wilson.
Vancouver, B. C.—A. J. Clark.
F. L. Swift, chief operator.
Victoria, B. C.—W. Christie.
Nanaimo, B. C.—W. F. Archibald.

GRAND TRUNK PACIFIC TELEGRAPH COMPANY.

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

OFFICERS.

Chas. M. Hays, president; E. J. Chamberlin, vice-president; A. Bruce Smith, general manager.

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

PRINCIPAL OFFICES.

Westfort, Ont.	Fenwood, Sask.
Dona, Ont.	Goodeve, Sask.
Raith, Ont.	Ituna, Sask.
Mack, Ont.	Jasmin, Sask.
Oscar, Ont.	Kelliher, Sask.
Quorn, Ont.	Leross, Sask.
Western Ont. Junct., Ont.	Punnichy, Sask.
Lake Superior Junct., Ont	Raymore, Sask.
Graham, Ont.	Semans, Sask.
Lost Lake, Ont.	Tate, Sask.
Clearwater, Ont.	Nokomis, Sask.
Walsh Lake, Ont.	Venn, Sask.
Change, Ont.	Watrous, Sask.
East Lake, Ont.	Young, Sask.
Reddit, Ont.	Allan, Sask.
Willett, Ont.	Bradwell, Sask.
Malachy, Ont.	Clavet, Sask.
Freeport, Man.	South Saskatoon, Sask.
Dugald, Man.	Grandora, Sask.
Dott, Man.	Asquith, Sask.
Elma, Man.	Juniata, Sask.
Vivian, Man.	Kinley, Sask.
Springfield, Man.	Leney, Sask.
Winnipeg, Man.	Biggar, Sask.
Cabot, Man.	Landis, Sask.
Portage la Prairie, Man.	Coblenz, Sask.
Caye, Man.	Scott, Sask.
Gregg, Man.	Unity, Sask.
Ingelow, Man.	Yonker, Sask.
Justice, Man.	Chauvin, Alta.
Rivers, Man.	Edgerton, Alta.
Pope, Man.	Wainwright, Alta.
Rea, Man.	Irma, Alta.
Uno, Man.	Viking, Alta.
Lazare, Man.	Holden, Alta.
Spy Hill, Sask.	Ryley, Alta.
Gerald, Sask.	Tofield, Alta.
Atwater, Sask.	Ardrossan, Alta.
Bangor, Sask.	Edmonton, Alta.
Waldron, Sask.	Edson, Alta.
Melville, Sask.	

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THE GREAT NORTH WESTERN TELEGRAPH COMPANY.

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

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

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

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

OFFICERS.

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

MANAGERS OF PRINCIPAL OFFICES.

Belleville, Ont.—P. F. Canniff.
Brandon, Man.—Miss E. Quigg.
Brantford, Ont.—E. Cameron.
Hamilton, Ont.—J. Jamieson.
Kingston, Ont.—T. A. Hanley.
London, Ont.—David Adams.
Montreal, Que.—L. S. Humes.
Niagara Falls, Ont.—George Phemister.
North Bay, Ont.—M. B. Douglas.
Ogdensburg, N. Y.—A. R. Porte.
Ottawa, Ont.—C. E. Davies.
Plattsburg, N. Y.—W. C. Crooks.
Quebec, Que.—C. E. Lillie.
St. Catharines, Ont.—T. E. Dudley.
St. Thomas, Ont.—George Rowley.
Sault Ste. Marie, Ont.—Miss A. Sutherland.
Toronto, Ont.—G. Hogarth.
Watertown, N. Y.—C. E. Comstock.
Windsor, Ont.—H. H. Hodgkinson.
Winnipeg, Man.—J. Padington.

THE AMERICAN DISTRICT TELEGRAPH COMPANY (NEW YORK).

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

Officers.—Theo. N. Vail, president; Wm. H. Baker and Newcomb Carlton, vice presidents; A. R. Brewer, treasurer; I. B. Ferguson, secretary and auditor; D. Skelton, general manager, and W. A. May, chief clerk.

Executive Committee.—Messrs. Theo. N. Vail, Union N. Bethell, Wm. H. Baker and Newcomb Carlton.

Directors.—Messrs. Theo. N. Vail, Wm. H. Baker, Union N. Bethell, Newcomb Carlton, W. C. Humstone, C. F. Patterson, P. V. R. Van Wyck.

THE AMERICAN DISTRICT TELEGRAPH COMPANY (NEW JERSEY).

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

OFFICERS.

Theo. N. Vail, president; Wm. H. Baker and Newcomb Carlton, vice-presidents; C. F. Patterson, general manager; I. B. Ferguson, secretary and auditor; A. R. Brewer, treasurer; Lewis Dresdner, assistant treasurer; Thos. E. Fleming, commercial superintendent.

SUPERINTENDENTS.

J. McRobie, general superintendent; C. C. Johnson, superintendent, Eastern Division; W. H. Harris, assistant superintendent, New Haven; G. L. Ross, assistant superintendent, Pittsburg; J. R. Kearns, assistant superintendent, Boston; J. Maxwell, assistant superintendent, New York City; W. H. Butler, assistant superintendent, Philadelphia; W. J. Bagby, assistant superintendent, Buffalo.

P. G. Kern, superintendent, Southern Division; W. F. Huber, assistant superintendent, Louisville.

R. C. Baker, superintendent, and George McGann, superintendent, Western Division; H. S. Fearons, assistant superintendent, Dallas; Frank Sloane, assistant superintendent, Indianapolis; J. H. Gates, assistant superintendent, Columbus.

J. M. Maddox, superintendent, Pacific Division, San Francisco, Cal.

E. W. Fuller, manager, San Francisco, Cal.
M. P. Reeves, manager, Atlanta, Ga.
C. J. Protzen, manager, New Orleans, La.
J. M. Diegel, manager, Minneapolis, Minn.
C. H. Dickson, manager, Kansas City, Mo.
H. M. Riner, Buffalo, N. Y.
G. Soderstrom, manager, Memphis, Tenn.
J. G. Harris, manager, Newark, N. J.
George Stewart, manager, St. Louis, Mo.

(Directory continued on page 57)

Rubber in Dutch East Indies.

In view of the fact that india rubber is used so extensively for electrical insulating purposes, and its limited supply gives much concern to all interested, the following figures regarding the cultivation of rubber in the Dutch East Indies, as of December 31, 1909, will be of general interest.

Ficus—planted 16,754 acres, being planted 4,493 acres; Hevea—planted 57,167 acres, being planted 70,590 acres; Ficus and Hevea (not specified)—planted 16,038 acres; being planted 26,369 acres; miscellaneous—planted 19,686 acres; being planted 24,661 acres; total planted and being planted, 235,758 acres.

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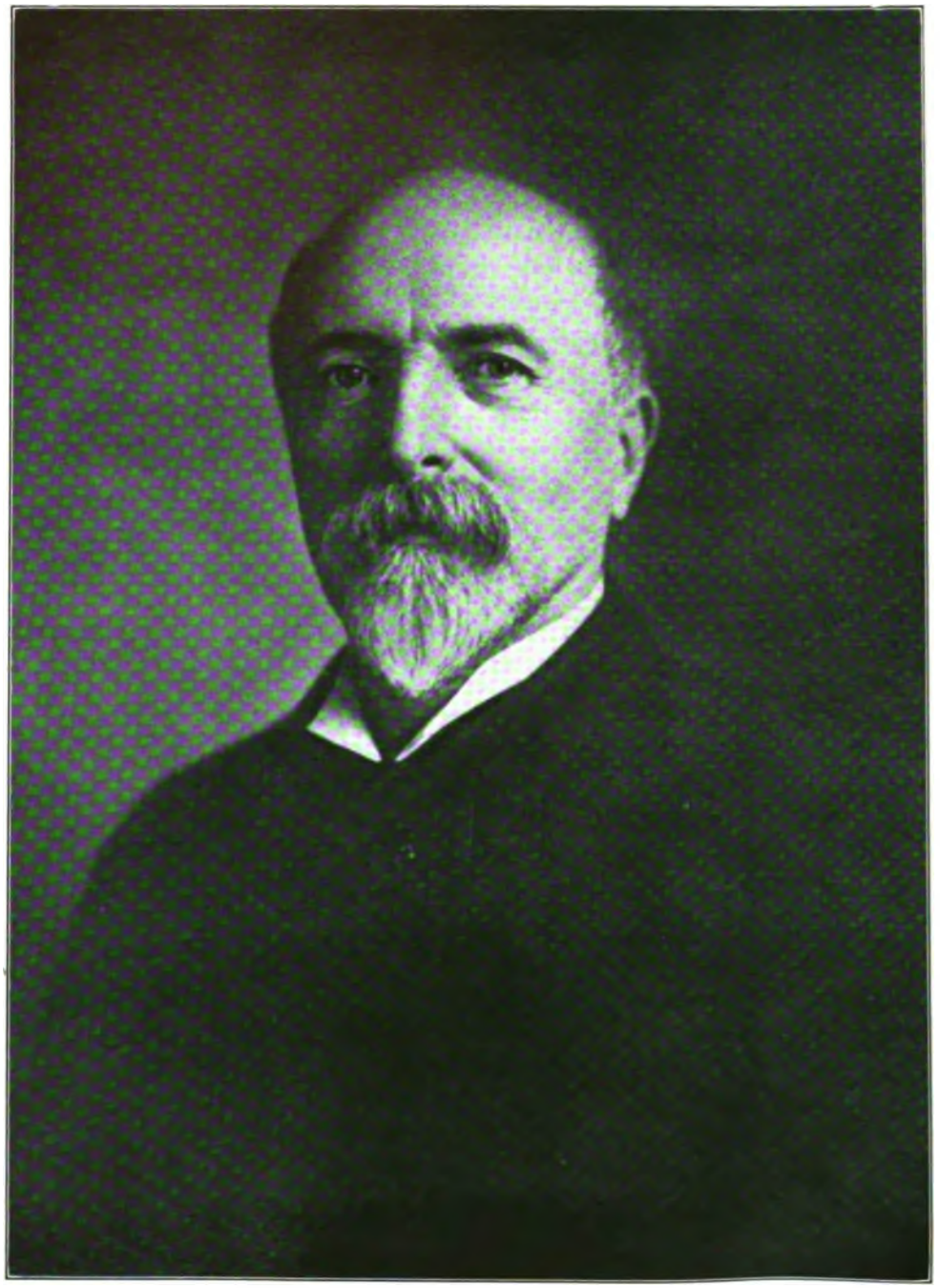

COLONEL ROBERT C. CLOWRY, NEW YORK.

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The Retirement of Col. Robert C. Clowry as President of the Western Union Telegraph Company.

Colonel Robert C. Clowry who retired from the presidency of the Western Union Telegraph Company on November 23, as announced in the December 1 issue, was one of the most commanding figures in the telegraph world. While his successor, Mr. Theodore N. Vail, was an operator in his earlier career he has not been intimately associated with the telegraph through so long a period as has Colonel Clowry. Colonel Clowry was essentially a telegraph man and has lived under telegraphic influence all through his long active business life, and as manager of the great telegraph corporation, has established a reputation that is world-wide.

Colonel Clowry was born in Will County, Ill., September 8, 1838, and after receiving a common school education he entered the telegraph service as messenger at Joliet, Ill., in 1852, for the Illinois and Mississippi Telegraph Company. In order to secure the privilege of learning telegraphy, he was required to serve as a messenger for six months without pay. At the end of his first year of service, he was made manager of the company's office at Lockport, Ill. He was later transferred to Springfield, Ill., and while there became well acquainted with Abraham Lincoln, then a young lawyer. A year later Mr. Clowry went to St. Louis and at the age of twenty-one was appointed superintendent of the St. Louis and Missouri River Telegraph Company.

At the beginning of the civil war he enlisted and was commissioned in 1863 by President Lincoln as captain and assistant quartermaster, and assigned to duty by the quartermaster-general in charge of the United States military telegraph in the Southwest, with headquarters at Little Rock, Ark. For his valuable service during the war he was brevetted by President Johnson, in 1865, as Major and Lieutenant-Colonel.

Colonel Clowry was honorably mustered out of the service May 31, 1866, at his own request, and was appointed district superintendent of the Western Union Telegraph Company's lines in the Southwest. In December, 1879, he was made assistant general superintendent of the Western Union Telegraph Company with headquarters at Chicago, and in May, 1880, succeeded General Anson Stager as general superintendent of the territory from Pennsylvania to the Pacific Coast, from the British boundaries to the Gulf of Mexico, west of the Mississippi and north of the Ohio Rivers. He was elected a director of the company in October, 1885, also a vice-president and a member of the executive committee, still retaining his position as general superintendent, with headquarters at Chicago. His election to the office of president and general manager took place April 1, 1902, and he moved to New York to take up the duties of his new position.

Since Colonel Clowry's assumption of the office of president and general manager, the affairs of the company have been conducted in a masterly manner. He has introduced many reforms and improved the service in various ways, and altogether, he has placed the great business of which he was the head on a foundation more secure and satisfactory than ever before.

It was quite natural that he should think that he was entitled to a rest after a continuous service in the telegraph work for over fifty years. Few men could stand such a strain but Colonel Clowry's splendid physique and temperate manner of living have well carried him through the vicissitudes of a business career of half a century, and now on his retirement from active duties he is still in possession of a clear and active mind and a well preserved body.

Colonel Clowry was relieved of a part of his onerous work last March, on the appointment of Mr. Belvidere Brooks as general manager of the company, and has since given his entire time to the duties of president.

His gentleness of manner and kindness of heart, have endeared him to all who knew him. The thousands of employes who have so long been under his direction, have felt his influence for good, and those who enjoyed a personal acquaintance with him will feel deep regret at his retirement, yet all will extend to him their sincerest wishes for his future happiness and comfort.

Underwriters' National Electrical Association.

The National Board of Fire Underwriters has transferred to the National Fire Protection Association the work of the Underwriters' National Electrical Association and the committee of consulting engineers of the national board, the former body being now known as the electrical committee of the National Fire Protection Association. The national board considers that the National Fire Protection Association is the logical organization for the assumption of all important codification work, its work in recent years in fire prevention, as well as protection, having entitled it to a high place among the engineering bodies of the country. The membership of the newly formed electrical committee of the association is as follows: Messrs. F. E. Cabot, Ralph Sweetland, J. E. Cole, C. M. Goddard and H. O. Lacount of Boston; George E. Bruen, J. C. Forsyth and Charles Lum, of New York; William S. Boyd, Dana Pierce and B. H. Tousley, of Chicago; Washington Devereaux and C. H. Hill, of Philadelphia; A. M. Paddon, of Syracuse; A. M. Schoen, of Atlanta, and R. P. Strong, of New Orleans. The committee will also include a representative of the American Institute of Electrical Engineers, the American Street and Interurban Railway Association, the National Electrical Contractors' Association and the National Electric Light Association.

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DETERMINATION OF SELECTOR RESISTANCES.

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Several letters of inquiry have reached the Telegraph and Telephone Age with reference to the article, "What Is a Selector," in the issue of June 16. These correspondents have asked particularly for information as to the method of determining the resistance to be connected in series with bridged selectors on telephone train despatching or message circuits. Appreciating the interest manifested in the technical details of the system described, the question referred to may be answered by the following statement of the method used in calculations for installations made by the United States Electric Company, makers of the Gill selector.

The factors entering into this problem relate to the quantity (amperage) and pressure (voltage) of the selector operating current, the distribution of the current, with respect to the number and location of stations and the fall of potential due to line resistance.

With the Gill selector .01 ampere is used for estimating the amount of current required for the safe operation of each selector. This is double the minimum operating current, and in addition to giving a wide operating margin, it allows for line leakage, etc. This permits of the maximum economy in the use of the cells forming the main signaling battery before the operation of the selectors will be affected by weak batteries.

The voltage required to give the selectors the proper amount of current depends upon the resistance of the selector. The voltage is determined by the well-known formula:

(1) $E = R \times I.$

in which E = voltage, R = resistance of selector, and I = current required by the selector.

The resistance of the Gill selector is 4,500 ohms, and the current, as given above, is .01 ampere. Substituting these values for R and I in the foregoing formula we have:

(2) $E = 4{,}500 \times .01,$

or voltage required = 45.

As two 40-ohm retardation or choke coils are connected in series with the Gill selectors to protect the selector winding from damage by lightning, the fall in potential through these coils should be considered. This is figured in the same manner as that given for the selector. The current through these retardation coils, owing to their being in series with the selector, is necessarily the same as that passing through the selector, i. e., .01 ampere. Substituting the resistance of the two coils (80 ohms) and the current (.01 ampere) for R and I in the formula previously given, we have:

(3) $E = 80 \times .01 = 0.8$ volts.

This, added to the voltage required at the selector terminals gives the following:

(4) Voltage at terminal of selector ....45. volts
Voltage at retardation coils ..... 0.8 "
Total voltage at terminals of selector and coils .....45.8 volts

DISTRIBUTION OF CURRENT.

The amount of current passing over the line wires to the selectors varies on the different sections, the section nearest the source of current supply carrying the maximum current. The current on the next section is decreased by the amount required by the first selector, that of the third section being decreased by the amount of current required by the second selector, and so on, until the last section is reached. This section carries only the current for the last selector. This will be readily understood by an examination of the accompanying diagram (Fig. 1), which shows four stations, each requiring .01 ampere.

FALL OF POTENTIAL FROM LINE RESISTANCE.

The resistance of the line enters into the problem, as it causes a fall in the potential or voltage in proportion to its resistance and the amount of current carried. This is figured by the same formula given under (1), i. e.:

Volts Drop = Resistance × Current.

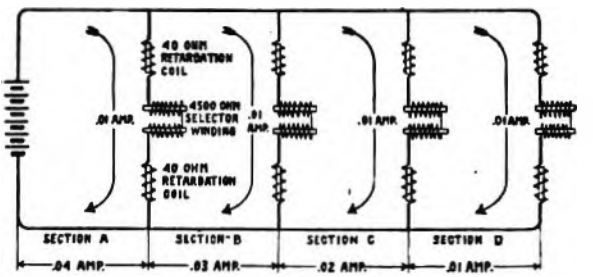

FIG. 1.—CURRENT DISTRIBUTION ON TELEPHONE TRAIN DISPATCHING CIRCUIT.

As the current on each section of the circuit varies with the number and location of the selectors, and as wires of various sizes and materials are employed, each section must be figured separately, after determining the following:

(5) a—Resistance per mile of wire.
b.—Resistance of the two wires or metallic circuit forming each section.
c—Total current flowing over each section.

The various values of "a" will be found in the accompanying table:

RESISTANCE PER MILE OF COPPER WIRE.

Size B. and S.	Diameter Mils.	Pounds per Mile.	Ohms per Mile.
0	324.860	1683.6	.51937
1	289.300	1335.2	.65490
2	257.630	1058.8	.82582
3	**229.420**	**839.68**	**1.0414**
4	204.310	665.91	1.3131
5	181.940	528.05	1.6558
6	162.020	418.81	2.0881
7	144.280	332.11	2.6331
8	128.490	263.37	3.3201
9	114.430	208.88	4.1860
10	101.890	165.63	5.2800
11	90.742	131.37	6.6568
12	80.808	104.18	8.3940
13	71.961	82.632	10.585
14	64.048	65.674	13.347
15	57.068	51.956	16.477
16	50.820	41.237	21.221
17	45.257	32.683	26.761
18	40.303	25.925	33.745
19	35.876	20.507	42.585
20	31.961	16.315	53.658

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The values of "b" are obtained by multiplying the resistance per mile of wire by twice the length, in miles, of the section being considered. The values of "c" are determined by multiplying the current required by one selector by the number of selectors beyond the end of the section nearest the source of current supply.

WIRE DATA.

The wire usually used for train dispatching and message circuits in the United States is as follows:

(6) Material—hard drawn copper.
Gauge—No. 9 Brown and Sharpe.
Diameter—.11443 inch.
Weight per mile—208.88 pounds.
Resistance per single wire mile—4.186 ohms.
Resistance per metallic circuit mile—8.372 ohms.

For other sizes, see the foregoing table of wire resistances.

As an example of the presentation of this calculation, the train dispatching circuit between Easton and Pen Haven Junction, Pa., is shown. The total length of line is 53.8 miles, and the circuit consists of No. 9 B. and S. hard drawn copper, weighing 208.88 pounds per mile. Gill selectors are used. The dispatcher is located at Easton and the main battery is located at the dispatcher's office. For clear presentation the stations should be arranged in order in a vertical column, beginning with the dispatcher's office, and space should be allowed for the five columns of figures as shown:

(7) RESISTANCE TABLE OF A TRAIN-DISPATCHING CIRCUIT.

	Miles between stations.	Current on each section in amperes.	Volts drop in each section.	Potential at each station to overcome drop.	Resistance at each station.
Easton	...	...	...	31.65	3165
Glenden	2.0	.140	2.3	29.35	2935
Bethlehem	9.6	.130	10.3	19.05	1905
East Pen Junction	3.9	.120	3.8	15.25	1525
Allentown	.8	.110	.75	14.5	1450
Gap Junction	1.9	.100	1.65	12.85	1285
Catasauqua	1.9	.090	1.4	11.45	1145
Coplay	1.9	.080	1.25	10.2	1020
Laurys	3.7	.070	2.2	8.0	800
Slatington	6.8	.060	3.3	4.7	470
Lizards Creek Junction	5.6	.050	2.3	2.4	240
Mahoning	2.5	.040	.8	1.6	160
Packerton	3.1	.030	.7	.9	90
Mauch Chunk	2.0	.020	.3	.6	60
Pen Haven Junction	8.1	.010	.6	.0	0
Length of line	53.8				
Total line drop, volts			31.65		

The first column shows the distance, in miles, between stations. In the second column is placed the current, in amperes, carried by each section of the line. With the Gill selector this will be the total number of stations × .01 amp. for the section between the dispatcher's office and the first station, and this product, less .01 amp., for the next section, the current on each succeeding section decreasing by a similar amount, as shown.

The drop in voltage on each section of the line is set down in the third column. These figures are obtained as previously explained in (5), or from the curves shown in Fig. 2. If the curves are used, proceed as follows: First locate the horizontal line corresponding to the distance under consideration. Follow this line to its intersection with the slanting line corresponding to the current carried by the section considered. The drop in voltage will be indicated at the foot of the vertical line nearest the intersection of the horizontal and sloping lines. For distances under two miles the enlarged portion of the curve at the lower right-hand corner of the figure may be used to advantage. The sum of the drops, in volts, in each section will give the total line drop, in volts.

In the fourth column are placed the figures obtained by starting with the drop of the last section and adding the drop of each preceding section to the sums thus obtained. Referring to the table in the third column and opposite the next to the last station (in this example Mauch Chunk) is found a .6 volt drop. This, plus the .3 volt drop shown in the section between Packerton and Mauch Chunk, makes .9 volt, for the potential required at Packerton to overcome the drop. Similarly the drop in the section Mahoning to Packerton .7 volt is added, giving 1.6 volt for the potential required at Mahoning to overcome the drop beyond that point. This is similarly continued until the top of the column is reached, the sums thus obtained being placed opposite the stations as shown.

The resistance to be placed in series with the selectors at each station is then obtained by moving the decimal point of these figures two places to the right and entering the figures thus obtained in the fifth and last column as shown.

The total voltage required is obtained in the following manner: Take the total drop in voltage due to the line resistance and add to it the voltage required at the last selector and the drop in voltage in the coils at the dispatcher's office. With the preceding case as an example, the following is obtained:

(8) Total line drop ..... 31.65 volts
Voltage required by selector at end of line ..... 45.80 "
Drop in coils at dispatcher's office (150 ohms × .14 amp.) ..... 21.00 "
Total voltage required ..... 98.45 "

If curves are not available for the wire used, the drop of voltage in each section must be figured, as previously explained, and placed in the third column of the table. The figures in the fourth column are obtained in the same manner, and if the current required by each selector is still .01 amp., the decimal point is moved, as before.

If, however, the current and voltage required by the selector differ from those required by the Gill selector, the resistances in each station must be obtained by dividing the figures placed in the fourth column by the required current. For example, assuming that the figures given in column four of the table are correct for the new current values of, say,

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.008 amp. per selector, the resistance for the first station would be obtained by dividing 29.35 volts by .008 amp. = 3668× ohms. The resistance at the other stations will be obtained by the same process.

With selectors operating at high speeds and depending upon slow and quick-acting electromagnets, the foregoing method of calculation may not apply. In all probability a non-inductive resistance, or one of a smaller value, would have to be substituted to permit of the successful operation of such systems. A constant which may be used with the resistances obtained in the manner described may be determined, applicable to various types of high-speed selector. The constant may vary according to the design of the magnetic circuit employed.

CIRCUITS WITH BRANCHES.

The preceding description has considered only a line without branches. When branch lines connect with the main line the method of figuring the resistance differs in some respects. The diagram (Fig. 3) shows a typical arrangement. In this the dispatcher and main battery are located at A, the wire is of copper, 208 pounds to the mile, and there are twelve stations, seven to the east and five to the west of the dispatcher.

The dispatcher being located at an intermediate station, the current for the selector is sent out in two directions. If the battery were located at the center of the line and the number of selectors on each half of the line were the same, the fall of potential on each half of the line would be the same. This seldom occurs, however, so that an unbalanced line condition may be assumed. As in the previous example, the stations should be arranged in a vertical column, with the distances between stations, and the current on each section in adjacent columns. There is this difference, however: the stations from A to H should be arranged in one group, and the stations from A to M in another group, as shown in (9) and (10).

(9)

RESISTANCES IN UNBALANCED CIRCUIT.

	Miles between stations.	Current on each section in amperes.	Volts drop in each section.	Potential at each station to overcome drop.	Resistance at each station.	
					1150	A
A to B	4.3	.070	2.4	11.5	910	B
B to C	5.6	.060	2.7	9.1	610	C
C to D	4.1	.050	1.6	6.4	480	D
D to E	4.9	.040	1.6	4.8	320	E
E to F	3.7	.030	.9	3.2	230	F
F to G	10.2	.020	1.7	2.3	60	G
G to H	7.5	.010	.6	.6	0	H
Total drop volts			11.5			

(10)

				11.5		A
A to I	5.2	.050	2.1	9.4	940	I
I to J	3.1	.040	1.	8.4	840	J
J to K	2.9	.030	.7	6.7	670	K
K to L	4.6	.020	.7	6.	600	L
L to M	7.3	.010	.6	5.4	540	M
Total drop, volts			5.1			

The figures in the fourth column (10) are obtained by consecutively deducting those in the preceding column, from the required voltage or potential at station A as obtained from the table (9), as this potential is required to overcome the drop in the other or longer sections of the line, which will necessarily be greater than in the portion being considered. It

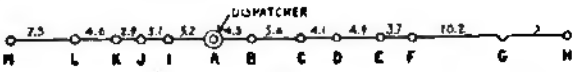

FIG. 3.—UNBALANCED TRAIN DISPATCHING CIRCUIT.

will be noted that it is necessary to have some resistance in the selector at station M, owing to this increased potential.

To the figure opposite station A must be added the 45.8 volts required at the terminal of the line and the drop in the coils at the dispatcher's office, which in this case would be

45.8 volts + (No. of stations on whole line × .01 amp. × 150) ohms = 63.8 volts.

or a total of 75.3 volts at the battery.

Where a circuit has numerous branches, such as are shown in diagram (Fig. 3), the problem is somewhat more complicated than those previously considered, but is solved by the application of the same principles. In this circuit the dispatcher is located at A, where the main battery is also located. There are two stations at junction H. There are twenty-

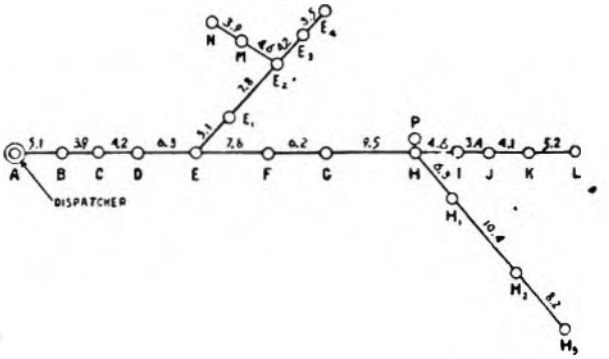

FIG. 4.—TRAIN DISPATCHING CIRCUIT WITH BRANCHES.

one stations in circuit, Gill selectors are used, and the copper line wire, weighs 208.88 pounds to the mile.

In a case of this kind it is well to consider some part of the circuit as the main portion, and in this case the part A to L is so considered. The drop in the various sections should be figured and the potential required at each junction be obtained as heretofore explained. With these figures as a basis, figure back on the branches as shown in table (10) and obtain the drop and resistance at the stations on the branches. Where there are branches on a branch from the main line, as from E2 to N, the same method of figuring back on the branch from the junction is followed. As this has been so thoroughly explained in this article, the detailed figuring for the circuits shown in diagram (Fig. 4) is not given. When two selectors are located at one station, they each take the same resistance and the cur-

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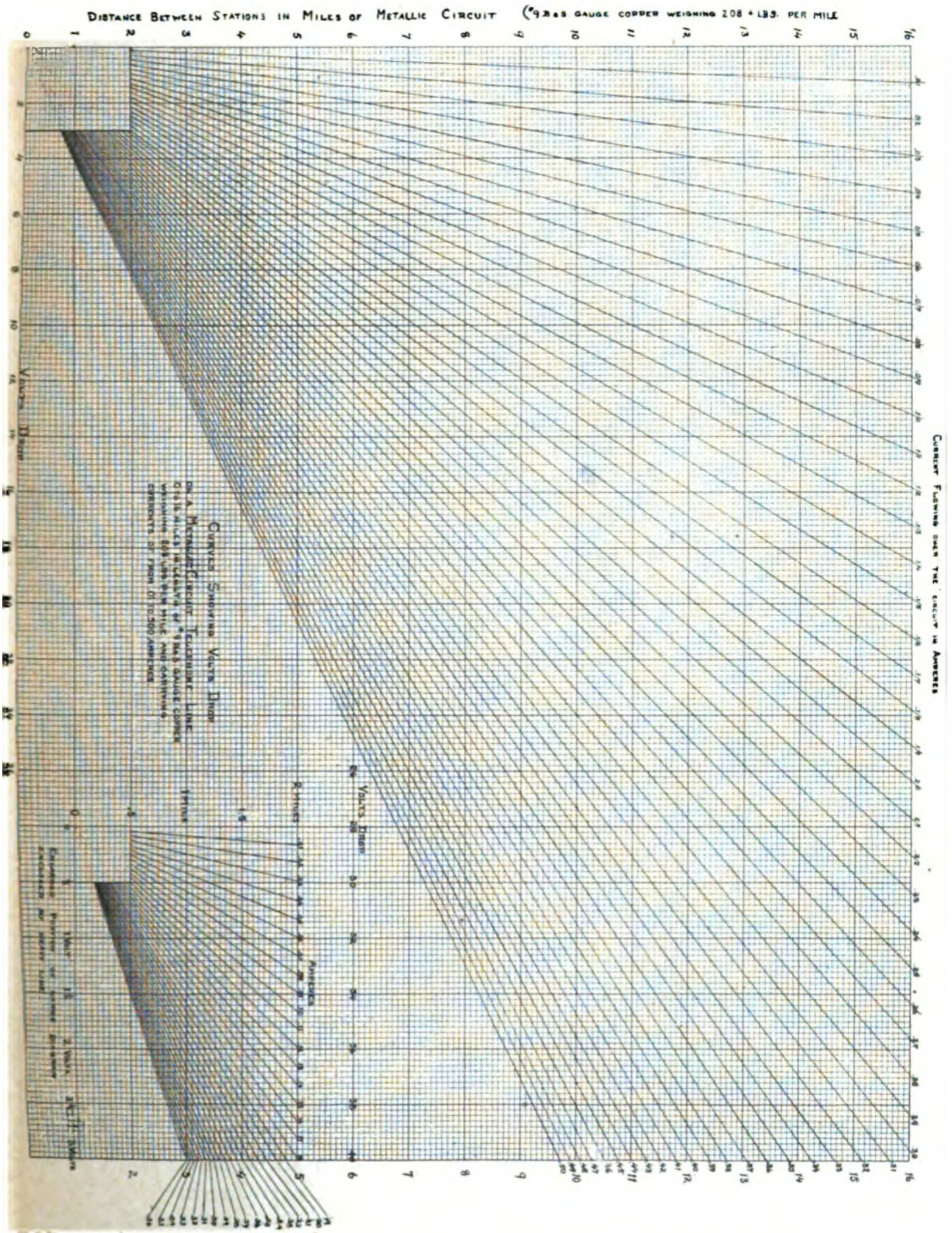

FIG. 5.—CURVES SHOWING RESISTANCE OF A METALLIC CIRCUIT TELEPHONE LINE.

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rent on the section beyond will be reduced by 2 × .01 amp.

In figuring the resistances on a circuit such as shown in diagram (Fig. 4), the current on the various sections of the main line must include that required by the branches beyond the section being considered.

Interrupter for Railroad Telephone Work.

A new interrupter, designed especially for railway telephone service, has been placed on the market by the Western Electric Company. This interrupter is especially adapted for use in block towers, where the operators are so busy that they do not have the time to call other stations by means of a hand generator. It is also especially well adapted for use on yard lines where several telephones are connected to the same pair of wires. It is not limited, however, to this class of work, but is very useful in all code ringing work, as the signals can be made very clear and distinct.

Fig. 1 shows an open view of the interrupter, which is intended to be mounted upon the wall in a vertical position in the same manner as a telephone set. The set is enclosed in a neat, well constructed oak cabinet, provided with a hinged cover. The mechanism is mounted upon the base of the cabinet and is readily accessible for adjustment, test and inspection.

The interrupter is operated by means of a key, or push button, which closes a battery circuit containing four to eight dry cells. It is recommended

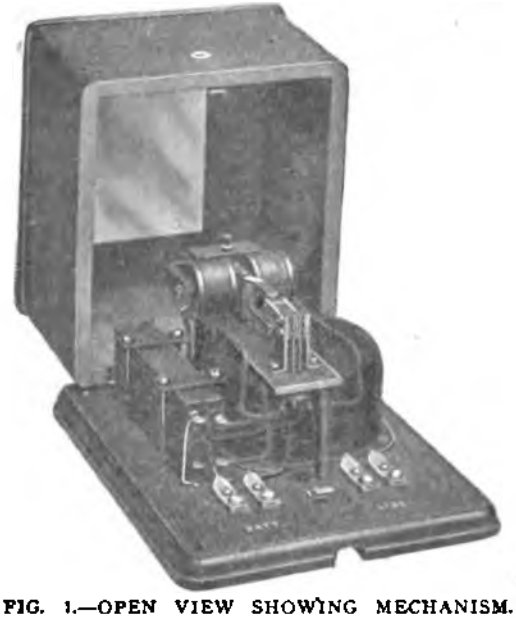

FIG. 1.—OPEN VIEW SHOWING MECHANISM.

that five dry cells be used, which will effectively ring fourteen 1,000-ohm ringers, or sixteen 2,500-ohm ringers on a line of 500 ohms resistance, an equivalent of about a thirty-mile metallic circuit of No. 12 B. and S. copper wire.

The interrupter is so adjusted that it responds at once when the key is pressed, closing the battery circuit. This insures a very economical current consumption, as the interrupter is in action only when the battery circuit is closed. The mechanism is practically noiseless and sparkless, and all circuit

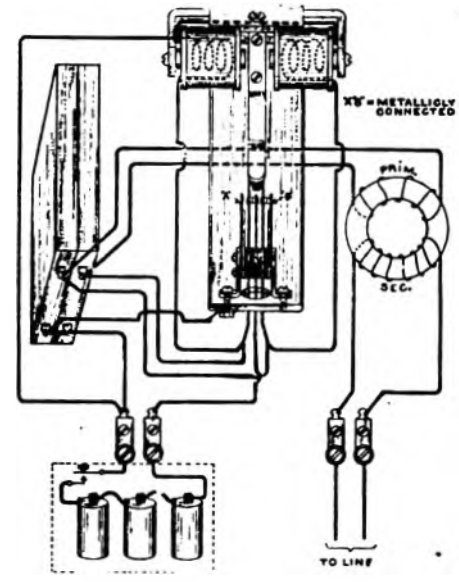

FIG. 2.—CIRCUIT DIAGRAM.

contacts are of platinum. While the mechanism is very sensitive, it is built in a substantial manner which insures long service and low maintenance.

The circuit diagram shown in Fig. 2 shows the simplicity of the circuit and the ease with which it can be connected.

Who Left the Bell Cut Off?

BY EDGAR C. DODGE, CHICAGO.

A great deal of annoyance is frequently caused in large offices where bell circuits are maintained between repeating stations, by quadruplex men neglecting to throw the switch to its proper position after using the bell. The result is that the man at the repeating station must send a wire message, when he could have been able to get prompt attention had somebody not forgotten to cut in the bell.

We all make mistakes and the more mistake-proof we can make things the better we shall get along; yet we should not tax our minds with anything that we can be relieved of.

A simple way to avoid the bell trouble is to equip the bell local with a back contact push button so arranged that the bell is out only so long as the button is kept pressed down. This may be easily handled with the left hand while the right is manipulating the key. Then when the circuit is left the bell is always set for further use. A small label on the switch reading:

"USE THE BUTTON."

should be enough to warn everybody concerned, and they would soon learn to keep their hands off the switch except in cases of the bell wire being out of service.

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Railway Telephone Maintenance.*

BY WOOD WILSON.

With the commercial telephone companies the greatest factor in maintenance is cost; with us, efficiency should be the first consideration.

Starting with a magneto telephone the important item is the battery. Within the last ten years the dry cell has been improved in quality and reduced in cost, until it has entirely supplanted the Fuller cell, which was almost universally used previous to that time. The essential features of a dry cell for telephone use are slow deterioration when not in service, the ability to recuperate rapidly during periods of use, and long life in service.

An ammeter, for measuring dry cells, should have a resistance about equal to that of the primary circuit of a telephone. Those commonly used have a very low resistance, practically short circuiting the cell under test, which greatly injures it in a few seconds. In measuring the current of a cell a firm contact should be made on the brass terminal, as the carbon offers a high resistance, making a material difference in the reading.

While good results are obtained by connecting batteries in parallel for use with low resistance transmitters the best results are obtained by using a high resistance transmitter and connecting the batteries in series, three cells being commonly used. The cells should have a moisture proof covering over the zinc, and should be placed in or as near the telephone as possible and not less than a No. 19 gauge wire should lead to the transmitter and induction coil. Batteries placed in cellars or other damp places are not only short lived, but as they are connected through the switch hook and secondary to the line, they cause leakage and an unbalanced line. On the other hand they should be kept away from radiators or registers, as they are worthless when dried out.

No more dry cells should be carried in stock than are actually needed, as they should be used within one month of the date of manufacture. In coupling cells together the wire should be thoroughly scraped and looped around the binding post to the right, and the nut tightened with pliers, care being taken not to cut the wire by tightening the nut too much. Very good connectors may be made by saving the tips of desk cords and soldering a short piece of wire to them, as they give a large surface contact and are not injured by tightening. Care should be taken that no zinc binding posts shall touch that of another cell when placed in the telephone.

The hinges of a telephone should not be used as part of primary circuit, as the springs deteriorate very rapidly, around a railroad, causing opens or high resistance. Where the transmitter is mounted on a door, flexible cords should lead around the hinges. Tinsel telephone cords are very fragile, and their life is greatly lengthened by using telephones and receivers with internal binding posts which prevent their breaking at the tip. They should always be kept dry, as when moist they are noisy and also give a "permanent" signal at common battery exchanges. In renewing cords, care should be used to see that they are not reversed. It is surprising to find that some of our most careful men make so many errors in connecting the cords of desk telephones. One way to eliminate this trouble would be to have three styles of cord tips on a triple cord and have terminals that hold only the proper cord tip.

Where it is necessary for a desk extension cord to have a cord weight attached there should be a hard rubber bushing in the hole in the desk to prevent wear. The use of cord weights, however, on this class of cord is not advisable, as the short bending soon causes noise from broken tinsel. The various types of folding and swinging desk sets reduce the cost of cord maintenance very considerably.

The switch hook of a modern telephone requires very little attention, unless it is bent out of shape or in very dusty places. Dust sometimes settles on the top of hard rubber between springs and when strong ringing currents are used, causes an arc which carbonizes the rubber, causing a short circuit. Dust between the platinum contacts can be removed by depressing the switch hook and placing card board on paper between contacts, then raising the hook and withdrawing the paper.

The adjustment of polarized bells is a source of much trouble to some repairmen. No adjustment has been found that will meet all conditions, as a bell at the distant end of a party line necessarily receives less current than a near one, and must have the armature set closer to the core than others. The armature should be so adjusted that the clapper rod will not touch the sides of the hole through which it passes. The gongs should then be moved until they come as close to the clapper as possible without touching it when the armature is resting against the core. This adjustment will allow undamped vibrations of the gongs and the recoil of the clapper will tend to pull the armature away from the coil and strengthen the next stroke. Iron filings should be removed by passing a piece of card board or blotting paper between armature and coils, as they cause the armature to stick by forming a magnetic bridge around the brass pin, which is placed in the armature to prevent sticking. The armature should have as little end shake as possible without binding. The permanent magnets often become demagnetized by abnormal currents and should be replaced or remagnetized by holding them against the field of a motor or dynamo.

A good hand generator requires very little attention, except a drop or two of oil on the bearings when they become dry. An excess of oil is liable to cause a short circuit by creeping in to the armature winding or by softening the hard rubber of the commutator. The magnets rarely lose their strength and it hardly pays to remagnetize them, unless one has a special helix and suitable current.

*Address to Pennsylvania Railroad Employes.

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The receiver magnet should be tested for strength by touching edge of the diaphragm across the poles, as it frequently becomes weakened by strong ringing current passing through it. All dust and especially iron and steel filings should be removed from it at each inspection. When a telephone is to be used both on magneto and common battery lines the receiver cord should be reversed if the common battery exchange cannot be heard distinctly, and if used on more than one common battery line, the lines should all be poled alike.

The office wiring, if properly installed, gives very little trouble. Where floor outlets are used they should be watertight, and should be under the desk where a mop will not touch them. Where wires pass down walls through the floor, hard rubber tubing should extend from the top of the mop board through the floor. Where joints are necessary they should be soldered. No joints should be pulled in floor conduit where they cannot be inspected. It is better to pull in a new piece and use the short pieces for other work.

The average protector on the market has entirely too many joints. The ideal protector should have but four joints in the talking circuit. These should be formed by four strong screws which will bring the wire and fuse ends under the same screw. Very few repairmen carry suitable wrenches for the nuts on protectors, and in using pliers the lock nut is often tightened and the wire may be loose.

Nothing smaller than No. 14 B and S. twist should be used for subscribers' loops. In splicing twisted pair, a Western Union joint should be made and well soldered. It should be wrapped with rubber tape then slightly warmed and covered with friction tape. The splices in both sides of a pair should not fall together, as any leakage across joints in wet weather not only causes noise, but soon eats wires off on common battery lines. In dead-ending twisted pair on insulators, do not make turns short around the wire but let them extend out in a spiral form, covering several inches from the insulator, as wire may be taken down and used again if no short kinks have been made in it. Twisted pairs should not be used for overhead railroad crossings, where open copper will do, as the vibrations from the exhaust cause intermittent opens which are very hard to locate.

Terminal boxes should be waterproof and as nearly airtight as possible, as the sulphur from engines soon destroys the arresters. It is well in case of large terminals to have two sets of doors and pack the bottom of the box with loose asbestos, where cables and wires pass through. A wire screen should cover the bottom of the box outside to keep sparrows from nesting in them, or from carrying away the asbestos packing. Sparrows' nests are often ignited by lightning, thus destroying the terminal. These birds have also been known to strip the wires of all insulation. All lines entering a cable terminal should pass through a pair of fuses and have carbon or copper block cut-outs on the cable end of the fuse. Frequent tests of these should be made to see that they are well grounded.

To be able to locate and clear cable troubles promptly, complete records should be kept, showing distances between all manholes; also span measurements of all aerial cables and distances between terminals. A chart should be kept, showing each conductor, its gauge and terminals and switchboard number, if in use.

The most frequent cause of trouble in cables is moisture, which is indicated by "permanent" signals at common battery exchanges or cross-talk at magneto exchanges. Prompt action will usually allow one to locate trouble by means of a Wheatstone bridge before all the conductors become wet, as otherwise it is necessary to string an outside wire for use in the Murray or Varley loop methods. Several types of trouble detectors are in use, for which good results are claimed. They consist of an apparatus for sending tone to the fault and a detector with a head receiver to be carried along in close proximity to the cable; the tone being heard until the fault is reached. Several other methods may be used when proper facilities are not at hand, such as removing all grounds from the sheath of a cable and grounded conductors, then advance along the cable toward the supposed fault, holding a needle in each hand connected to a head receiver or milli-ammeter. Place the needles on the sheath as far apart as you can reach and a slight click will be heard in the receiver, or a deflection noted on the milli-ammeter until the fault is reached.

When water in a cable becomes frozen and conductors show clear, a torch carried along the sheath will thaw it out and cause the line lamps to burn when the fault is reached. Having located the moisture, if in underground, a piece of cable must be pulled in a vacant duct and the old cable cut over to the new cable at manholes on each side of the fault. If an aerial cable, the sheath should be cut off from a little shorter length than the sleeve to be used, and the core boiled out with paraffine until all traces of moisture are removed. If the moisture has run back too far to be drawn out in this way it may be necessary to cut a new piece of dry core in. If the cable has been wet for any length of time a new piece is best, as the insulating qualities of the paper are spoiled by the decomposed copper deposited on it by electrolytic action.

Frequent readings should be taken on underground cables for current which would cause electrolysis. If the current flows from the surrounding earth to the cable at all points, no damage will occur, but if in the opposite direction the cable should be bonded to the negative side of the street railway or other circuit from which the leakage comes. Insulating sleeves placed in the sheath of cable leaving steel structures will often prevent the flow of the current, or for short lengths of underground cable, a good plan is to place it in iron conduit which should be properly drained; then electrolytic action will take place on the conduit instead of the cable.

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As the electrolytic currents vary with the load carried on the disturbing circuit a good precaution is to have a pair of insulated wires leading from each manhole to the terminal room, having one side connected to earth and the other to the sheath of the manhole and placing a recording voltmeter on a circuit for a week at a time, thus making a chart of the current for all days of the week.

If heat coils are used they should not have inductive windings, as the impedance causes serious transmission losses, in addition to loss from the resistance of the coil. Much noise is caused on trunk lines by poor contacts between ends of heat coils and plate springs, which become oxidized in a short time.

Main and intermediate frames should be located in a dry place, as in damp basements the jumpers are soon eaten off by electrolytic action, and much cross talk also results. Dust should be removed daily from all terminal strips, especially horizontal ones, by use of a moulders' bellows or vacuum cleaner. Nothing but rubber covered, flameproof, braided, tinned, copper wire should be used for jumpers.

Not one man in ten makes a good soldered joint. In soldering copper wire nothing but resin should be used as a flux. All other soldering preparations for copper wire are for lazy men; for if the copper is cleaned and is covered by a film of rosin, the solder will always flow. Most soldering preparations clean the copper by chemical action when heat is applied. This chemical action continues to some extent until the terminal or wire is destroyed. After the terminal and wire are cleaned and in place, hold a piece of resin core solder on the joint and touch the point of the soldering copper to it. This will allow the resin to flow into the joint before the solder, thus preventing oxidizing of the copper.

The handle of a soldering copper should be held high enough to allow solder to flow to the point. When solder flows remove the soldering copper quickly. Never use sal-ammoniac to tin a soldering copper, as it will soon eat pits into it and make frequent dressing necessary. If it should need dressing use a file to shape it up, then heat and rub on a piece of sandpaper, at the same time applying resin core solder.

All trunk lines should pass from the main frame to a patch or test panel which should contain four jacks for each line. These jacks should have platinum contacts and be spaced to receive a double plug for patching or testing. The line side jacks should be placed one above the other, and the switchboard jacks to the right of them. These jacks are strapped together in such a way that a double plug placed on the line side will connect with the line and leave the switchboard side open, and vice versa. Patch cords should be provided, which will allow any line to be cross connected to any other line on the panel.

Composite sets and simplex coils should terminate on jacks in the same manner. Several "Morse" wires should lead from the telegraph office to the panel, so that any kind of circuit can be plugged on any line, or in case of storms a telephone line can be split up into Morse lines.

In locating patch panels at various points on long lines care should be used to place them at points where local lines will be available for patching around breaks in the through lines. Heavy gauge wire should be used to lead into panels from through trunks, to keep the resistance as low as possible. Where one man looks after the patch panel and test table, it is well to have them combined.

The test table should be equippel with a 100,000 ohm voltmeter, having a fifty-volt scale. A set of dry cells, sufficient to give fifty volts, should be grounded at one terminal and the other terminal carried through a series of switches, grouped in such a way that the battery will pass through the voltmeter and out on a cord terminating in a double plug which will fit the jacks on the patch panel. One switch should be arranged to reverse the line, another to ground the opposite side of line for continuity tests, another to cut off battery when measuring foreign current, another to reverse the voltmeter when foreign current is of the opposite polarity, another to throw a low resistance shunt around voltmeter when measuring foreign currents which may be of a higher voltage than the voltmeter. Keys should also be provided to connect a telephone to the cord and to throw battery out on the line, for testing common battery telephones.

Ringing keys should be wired in circuit, one each for metallic ringing, tip to ground, ring to ground and pulsating positive and negative where selective systems are used. A key should be mounted which will cut in an artificial twenty-mile cable for transmission testing. This artificial cable should consist of resistances and capacities equivalent to twenty miles of low capacity, No. 19 B. and S. gauge cable.

Two test lines should lead from jacks on the test-table to test cords on telephone switchboards. Battery should be supplied to the sleeve of these cords through lamps on the test table. This battery will serve to operate the cut-off relay and will burn the lamp as an indication that a line is under test.

Much better transmission can be secured if the storage batteries have an ample capacity, as the voltage will hold up better on the peak of the load. Manufacturers' instruction for care of storage battery must be strictly adhered to if the best results are to be obtained. The battery terminals should be well soldered in addition to bolting and very large conductors should lead to bus bars by the shortest route possible, and all switches should be of a capacity several times greater than the current to be carried, as a fraction of an ohm in the battery circuit will cause cross-talk.

The commutators of motor-generator sets should be kept thoroughly cleaned and polished, as noisy lines will result, especially on loaded trunks, if they are rough. If carbon brushes become rough, the machine should be stopped and a strip of sandpaper drawn under brushes with the smooth side

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against the commutator, thus grinding the carbon to conform to the commutator. Vaseline or paraffine can be used under brushes, but the results are not as good as obtained from some of the compounds on the market. Brushes should always be set diametrically opposite one another, and the yoke shifted until the maximum current output is reached and no sparking results.

As switchboard maintenance would form a subject for an additional paper, only a few of the most important items are here mentioned. Daily tests of all switchboard cords should be made by plugging in a noisy line and moving the cord just back of the plug, when any cut-off can be detected by the interruption of the noise. In a small exchange cords can be cut off and plug reset without removing them, but in a large office they should be removed for repairs. Cord weights should never be allowed to touch the floor, as the noise is very annoying to operators. In looping up slack in a long cord the loops should be made as close to the end as possible in order that the cord will reach the farthest multiples. Series jacks are very objectionable in a large board for railroad use, as much dust gets in the contacts, causing open or unbalanced lines. When switchboard plugs have been out of service they should be buffed with jeweler's rouge to remove oxidizing, as it forms a very high insulation.

No. 14 twist should lead from arresters in cable terminals through enameled iron bridle rings on bottoms of cross-arms to aerial copper lines; the latter should be dead-ended with a half sleeve and enough end left, to give space to solder the jumper, which should have only one or two turns to the inch of line wire, as closely wrapped wire does not make a good contacts, and is ruptured by short bends. If construction men do not carry a soldering outfit they should use test joints, which should be removed when soldering is done. Too little attention is paid to joints in trunk lines, as we spend thousands of dollars for heavy gauge copper to give a low resistance line when a better line might be built at half the cost by having perfect joints. Frequent resistance measurements should be made on all trunk lines and records kept, together with temperatures, so that any unusual resistance can be noted and removed. These records will also be useful in locating trouble by the Varley loop method.

Poles Purchased in 1909.

The total number of poles reported to the Bureau of the Census, at Washington, as purchased during the calendar year of 1909 by the telegraph and telephone companies, steam and electric railroads, and electric light and power companies of the United States was 3,739,000, as against 3,249,000 in 1908 and 3,283,000 in 1907. There were purchased in 1909 by the same class of users 3,509,000 cross-arms, 6,168,000 brackets and 18,463,000 insulator pins. Cross-arms, brackets, and insulator pins were not included in the annual census of lumber and timber products prior to 1909.

This information appears in a preliminary comparative report, covering 1909, 1908, and 1907, which was transmitted to Census Director Durand by Chief Statistician William M. Steuart, under whose supervision it was prepared by J. E. Whelchel, expert special agent of the Division of Manufactures. In co-operation with the Forest Service of the Department of Agriculture, the Bureau of the Census annually collects and publishes statistics pertaining to the group of lumber and timber industries.

Telephone and telegraph companies reported purchases during 1909 of 2,916,000 poles, or 78 per cent of the total. This was an increase over 1908 in the number reported as bought by this class of users of 354,000 poles, or 14 per cent, and over 1907 of 604,000 poles, or 26 per cent. Steam railroads reported the purchase of 26 per cent more poles in 1909 than in 1908, though 34 per cent less than in 1907, while the reported purchases by electric railroads and electric light and power companies were 18 per cent greater than in 1908 and 7 per cent less than in 1907.

There was little change in the average cost per pole of all lengths and from all species of wood in 1909, as compared with 1908, it being $1.89 in the later and $1.82 in the earlier year. The average cost per pole, $2.46, in 1907, was substantially larger than in either of the later years, mainly for the reason that a class of pole consumers in the United States which uses chiefly short poles was not included in the census for 1907.

Cedar continues to be the principal pole timber, contributing 65 per cent of the total purchases in 1909, 68 per cent in 1908, and 64 per cent in 1907. Chestnut, after cedar, was used in greatest quantity in all three years, forming 16 per cent of the total in 1909, 16 per cent in 1908, and 19 per cent in 1907. Among the remaining species, the increase in the number of oak poles reported as purchased during the last three years is noteworthy; more than three times as many poles from the species having been reported as purchased during 1909 as was the case in 1907.

Substantial progress in the practice of treating poles with chemicals to preserve them from decay is disclosed by the returns for 1909, nearly one-sixth of the total purchases during that year having been given some preservative treatment, as against about one-tenth in 1908 and one-eighth in 1907.

Of the total outlay during 1909, $1,621,000, for crossarms, brackets, and insulator pins, the telegraph and telephone companies contributed 63 per cent, electric railroads and electric light and power companies 3 per cent, and steam railroads 4 per cent.

Mr. W. H. Stansell, manager of the Postal Telegraph-Cable Company at Wilmington, N. C., in renewing his subscription for the ensuing year writes: "I have been a subscriber to your paper for several years and I always grow as impatient for its arrival as children for Christmas."

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The Manager.

BY H. SCRIVENS.

Superintendent Postal Telegraph-Cable Company, Pittsburg, Pa.

A Postal telegraph office always represents the investment of a certain amount of money, in most instances a very considerable sum, as the building and maintenance of a telegraph line and the equipment and maintenance of an office is expensive work. When a manager is appointed to take charge of an office it practically means making him the custodian of the money represented by the office and line. It should be his aim to obtain the very largest return on the investment.

An office is bound to do more or less business —that is to say, as the company is well established a certain amount of business will naturally flow to it. But what counts is the business a manager secures over and above what comes without effort, and there is just where the manager's ability and worth are shown to advantage. Ability to hold the position of manager does not signify success, but ability to do the largest possible volume of business does indicate the successful manager. There are so many ways of securing business and the conditions in different cities vary so widely that no hard and fast rules can be set down for managers to follow, except everlastingly strict attention to business and constant planning and effort to constantly secure more and more of it

Upon the manager rests the responsibility for the discipline of the office, the courteous treatment of patrons, the attention they receive over the telephone, and the actions of the messenger boys. I fully realize that the latter is quite a problem, but by far the majority of our boys are good honest workers, and may be developed by proper treatment and proper handling. It often happens that a boy with good intentions is spoiled, at least temporarily, by petty impositions or inconsiderate treatment by a clerk or others, and this is something which the manager should guard against by an understanding that he is ever willing to listen to and adjust any differences which may arise with the boys. The work performed by the messenger is just as important as that of the clerk or operator, since the service on a telegram is not complete until it is delivered to the addressee and an improper delivery may undo the hard work of a manager in some distant city.

Giving credit where it is due is an excellent plan. Responsibility for faulty work should be placed where it belongs. There is frequently a disposition to shift responsibility for errors and omissions. But that is unmanly and weak, and the manager can do the individual and the company a vast amount of good by insisting that those at fault shall assume the responsibility, and that the same error should never be made twice.

A branch manager in one of the large cities a short time ago tried the experiment of personally instructing all new boys as to their duties. He warned them that they would certainly be detected in any wrongdoing. He then noted their work, and later, for a short period, let the new boys start in without instructions, and the While the boys were instructed and warned, things moved smoothly and properly, but when difference between the two plans was startling. instruction and warning were stopped trouble began. This experiment may be of value to other managers.

Another responsibility devolving upon a manager is the training of those under him so that there will be hearty co-operation in everything pertaining to the getting and handling of traffic. A good corps of workers from the messenger up is a wonderful help. It rests with the manager to encourage and develop those who show a disposition to be of assistance, and weed out those who are satisfied to drift with the tide. We look to the operators for our future managers, and managers should train such operators as show a disposition to advance. I frequently find very promising managerial material in operators, but they have not been immediately available because the manager has not instructed them in handling accounts and reports. Managers should feel that this is a duty they owe not alone to the company, but to each of their fellow employes as they consider trustworthy.

A manager is also depended upon to properly represent the company in the appearance of his office. This can be done only by scrupulous cleanliness and orderliness, which is the standard set by the company.

Our managers are on a par with other business men in that they represent a thoroughly reliable, well organized and splendidly equipped company, giving the best telegraph service that has ever been given. They have every reason to feel proud of their positions.

Considerable good advice has been given on the subject of fast callbox service, prompt handling of correspondence, practice of economy, quick adjustments of complaints, and other important matters, so that it is not necessary for me to touch on them; the object of this article being to point out the responsible position which the manager holds and the urgent need for him to live up to the responsibility in its many phases.—*Postal Telegraph.*

New Telephone Plant in the Canal Zone.—A new telephone exchange has been established at Miraflores, Canal Zone, Isthmus of Panama. Pedro Miguel, Corozal, Ancon quarry and Balboa are connected with the new exchange, from which about fifty stations are served. Service is furnished during working hours only and but one operator is employed. It is expected to extend the service to about 100 stations, using the party-line system.

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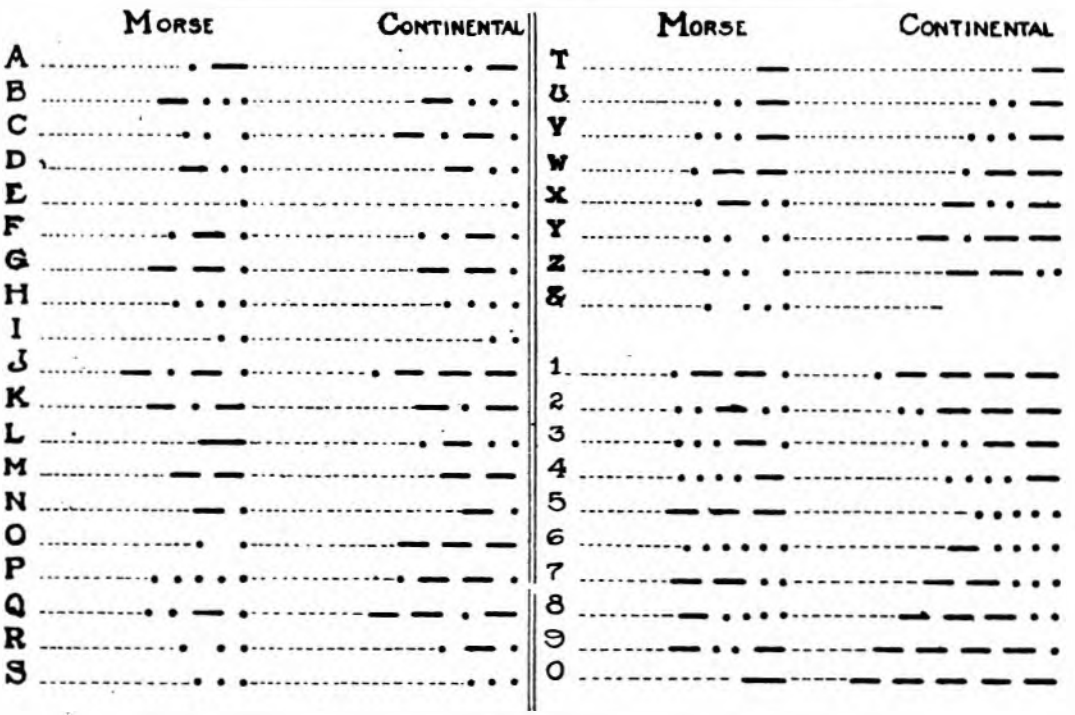
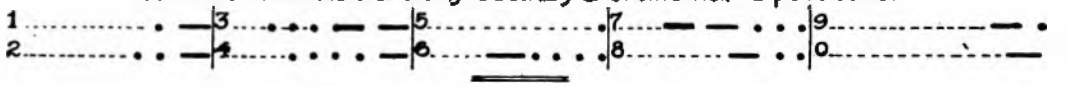
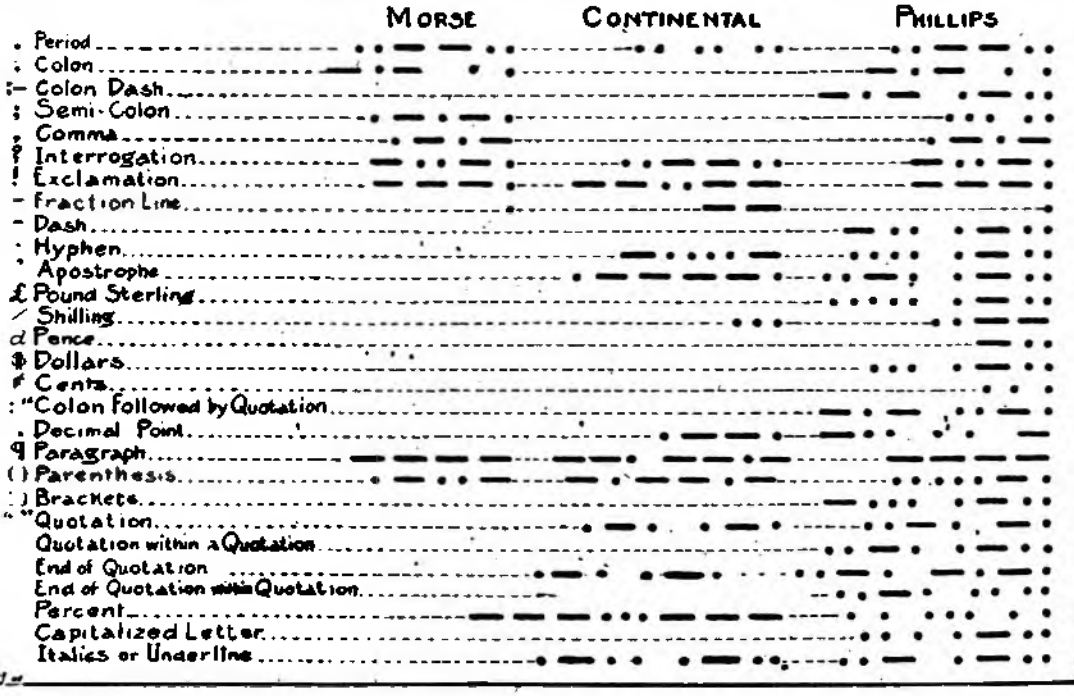
TELEGRAPH CHARACTERS



Short Numerals Generally Used By Continental Operators.





In the Phillips' Code, punctuation signals for fractions used generally in the United States are sent by inserting the letter e between the numerator and the denominator, thus: Three-sixteenths—3 e 16.

Owing to the fact that three ciphers when quickly transmitted bear striking resemblance to the figure 5, it will always be better to use tnd for thousand an myn for million when thousands or millions are expressed after the first, second or third figures by ciphers exclusively, thus: 10,000—10tnd; 248,000,000—248myns.

Hnd may also be used to advantage sometimes to express hundreds, thus: 400—4hnd; 500,000—5 hnd tnd; 300,000,000—3 hnd myn.

Decimals should be sent by inserting the word "dot," thus: 0.34—o dot 34; 89.92—89 dot 92.

When an omission occurs in the copy, and the fact is shown by the presence of asterisks, the letter x several times repeated will indicate that asterisks are to be inserted in the copy to be sent out, thus: And this has been one of the results x x x x x Who shall account for such corruption—And this has been one of the results * * * * * Who shall, etc.

In sending poetry or one or more lines of verse, a paragraph mark (— — — —) should be used at the end of each line.

The United Wireless operators use the Morse code, while the Marconi wireless telegraphers use the Continental code.

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Application of Interstate Commerce Act to Telegraph and Telephone Companies.

With a view to reaching a satisfactory determination of the application of the present Interstate Commerce act to telegraph and telephone companies, the Interstate Commerce Commission on December 7 gave a hearing to officers of telegraph and telephone companies, which, by the terms of the law, are made common carriers. Some of the questions presented to the conference were:

"What telegraph and telephone companies are subject to the act?

"May such companies issue franks entitling to free interstate service, or may they grant free interstate service?

"Are telegraph and telephone companies required to file with the commission their tariffs of charges?"

"Does the law forbidding rebates and undue preference apply to telegraph and telephone companies?"

It was not the purpose of the commission to determine the status of any particular company, but rather to induce a discussion of the meaning and application of the law to the new common carriers generally.

Attorneys for the telegraph and telephone companies said that the transmission of messages was an entirely different thing from the transportation of persons or property, and it was their opinion that the difference between the words transmission and transportation was sufficient to relieve them of the necessity of filing their tariffs.

The hearing lasted but two hours and, with this one exception, the representatives of the "transmission" companies agreed that they were subject to the law in every other particular.

Mr. Rush Taggart, attorney of the Western Union Telegraph Company, said that all the lines which he represented were interstate and that there was no separate or strictly interstate business. He was undecided whether telegraph franks could be exchanged for passes on railroads, as he had not looked into that subject.

Mr. Taggart said that the words transmission and transportation were entirely distinct, and since section six said transportation, it did not mean that the rates for telegraph should be filed with the Commission. Commissioner Clark referred to the section which used the word "facilities," and asked if that was not sufficiently elastic to include telegraph companies. Mr. Taggart said that the word "facilities" was used in the old act before the telegraph and telephone companies were put into the Interstate Commerce act.

Referring to the fourth question set for the hearing Mr. Taggart said that the telegraph companies could be fined for giving rebates or practicing other discriminations. Commissioner Clark wanted to know how the Commission would know when the company was guilty of discriminations if its tariffs were not on file, as this would permit the company to change a rate within five minutes and change it back the next five minutes. Furthermore the Commissioner wanted to know how the Commission was to suspend proposed advances to telegraph rates unless those rates were on file. Mr. Taggart said he had no answer for either of these questions.

Mr. Hunt Chipley, representing the American Telephone and Telegraph Company, held to the same views as Mr. Taggart. Commissioner Prouty asked Mr. Chipley to file a memorandum with the Commission showing just where the word transmission appears and in what sections it does not appear. Mr. Chipley said that it would be furthermore a physical impossibility for the telephone company to file its rates and place a copy with every station. Each telephone is a station, and he said that the company had about 5,000,000 of such stations and something like 1,420,000 rates. Adding to these the sectional rates for the further divisions, the number of rates would run up to over 13,000,000.

Mr. N. Koenigsberg, representing the International News Service and the National News Association, said that the law does provide for the filing of tariffs and that these tariffs are now in printed form. He desired further that contract rates made with large users of the telegraph and telephone be placed on file and subjected to the law prohibiting discriminations.

Mr. J. D. Cable, representing the Ohio Telephone Association, said that the local lines in his State had a contract by which outside business was taken care of. He believed that the local companies do not come under the provisions of the law.

Mr. F. H. Woods, representing the National Association of Independent Telephone Companies, said that the State connecting lines do come under the law when they do outside business. He said he wanted all rates filed so that competitive methods could not be used to kill and buy up a small company.

The United Wireless Telegraph Company was represented by Mr. W. D. McLain; the Marconi Wireless Telegraph Company of America, by Mr. John Bottomley and the Telepost Company by Mr. H. Lee Sellers.

Bound Volumes of Telegraph Age Covering a Memorable Year in the Telegraph.

The year 1902 was especially significant in the annals of the telegraph, inasmuch as that date marked the accession to office of the recent official heads of the Western Union Telegraph Company. The story as told in Telegraph Age distributed over the months of that year, chronicling the numerous changes that eventful period witnessed, is of interest, one viewed with importance by many as being of high referential value, furnishing data and dates nowhere else so readily available. A portrait of Colonel Robert C. Clowry, the incoming president and general manager of the company, and of General Thomas T. Eckert, whom he succeeded, as well as others prominent in the Western Union service, were included in the issues of the paper during that year.

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How Shall I Begin to Study Electricity?

BY JOHN F. SKIRROW.

Associate Electrical Engineer, Postal Telegraph-Cable Company, New York.

Not long ago I received the following letter:

"I wish to make quite a study of electricity in its relations to the telegraph business, taking it from the beginning where generated and following it through switchboards, various kinds of instruments, etc., learning the terms as applied to various currents and all such other information as would be of interest to any one making it a study. If you can do so, I should greatly appreciate it if you would give me the name of a book or set of books which in your judgment would best serve my purpose in this direction. I would also like permission to write you occasionally on matters which may not look clear to me."

This letter is a sample of many similar ones, and the reply to it may therefore be of interest to others who feel like asking the same questions. The reply was as follows:

"As regards the best books to study; this is a difficult question to answer, as I do not know what electrical knowledge you now have.

"If, to start with, you have some knowledge of the rudiments of electrical science, you will find 'The Quadruplex,' $1.50, by Maver and Davis, a very good book on the subject of duplexes, quadruplexes, repeaters, etc. 'American Telegraphy,' $5.00, by Wm. Maver, Jr., is an excellent book, covering all systems, including printing telegraph and ticker systems. 'Official Diagrams of the Postal Telegraph Company,' 50 cents, published by the Telegraph and Telephone Age, will give you our standard wiring methods, and the new book, 'Telephonology,' by Van Deventer, $4.00, will give you the latest and best about telephones and composite telegraphy and telephony.

"You may write me whenever you feel like it, and I will take pleasure in helping you to get an understanding of anything you may find difficult. Any of the above-named books can be obtained from Telegraph and Telephone Age, 253 Broadway, N. Y."

When the writer was asking the same questions twenty-five years ago, some one told him, "The first thing you want to do is to understand 'Ohm's law.'" That sounds formidable, but it isn't. "Ohm" was the man who discovered similarity in the behavior of electricity flowing in a wire, to water flowing in a pipe, and he established the rule which enables us to tell how much electricity will flow in the wire under various conditions.

We all know that water will flow through a pipe if the level of the water is higher at one end of the pipe than it is at the other. The reason for this is that the difference in the level of the water creates pressure, and it is the pressure that causes the water to flow. We can create pressure to make the water flow by raising the level of the water, or by mechanical means, such as a pump. The main point is that if we have a difference of pressure between one end of the pipe and the other the water will flow from the point of higher pressure to the point of lower pressure. When the pressure becomes the same at both ends of the pipe, the flow will stop.

We get similar results with electricity, using a wire instead of a pipe, electricity instead of water, and a battery to make pressure. As with water we make pressure by raising the level of the water or by the use of a pump, so with electricity we make pressure by chemical means (battery) or by mechanical means (generators). To get back to the water simile; the question "How much water will flow through a pipe?" would bring the answer, "That depends on the size of the pipe and the pressure of the water." Similarly, if you should ask "How much electricity will flow through a wire?" the answer would be, "That depends upon the size of the wire and the pressure of the electricity."

This brings three factors into the problem, "pressure," "quantity," and "resistance." The latter term means the objection put up by the pipe or wire to the passage of the water or electricity. Obviously the smaller the pipe or wire the greater the "resistance" to the passage of the "current," the "current" meaning the water or electricity that is flowing.

Now we have the three factors as pressure, current and resistance, and here is where Mr. Ohm comes in with his law. He says if you have any two of these factors you can always tell the third. In other words, if you know the pressure and resistance, you tell how much current you will have. If you know the pressure and the amount of current you can tell what the resistance is. If you know the resistance and the amount of current you can tell what the pressure is.

These things are vital ones to know in the operation of electrical apparatus, as all electrical apparatus is operated by current. So long as the electricity stands still, there is "nothing doing." To know how and what to apply electrically to operate apparatus we must ascertain the current required for operation. We must then determine the resistance offered by the apparatus, and knowing these factors we can, thanks to Mr. Ohm, tell just what pressure we will have to apply to secure the desired results.

Practically every electrical problem brings in these factors, and if the student will familiarize himself with this fundamental law governing them he will be building the best kind of a foundation for future study and development.

The generally accepted symbols for the factors referred to are as follows: "*I*" for current, "*R*" for resistance and "*E*" for pressure (another name for electrical pressure is "electromotive force," hence the abbreviation "E.M.F." or simply "*E*"). Now the law is that the amount of current flow-

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ing will be equal to the pressure divided by the resistance or to put it down in the accepted form (don't get scared, this isn't algebra) $I = \frac{E}{R}$. Now let's give I, E, and R numerical values. Suppose we say instead of the above, $6 = \frac{12}{2}$. Now, that looks a lot simpler, but it's just the same in a way,

Now, it's plain to see that, if $6 = \frac{12}{2}$, then $2 = \frac{12}{6}$ and $12 = 6 \times 2$, or, to get back again to the letters, $I = \frac{E}{R}$, $R = \frac{E}{I}$ and $E = I \times R$.

Now, where do the figures come in and how are we going to apply them? Because Mr. Ohm discovered this law his name has been perpetuated by using it as a measure of resistance. So we measure resistance by ohms, just as we would measure water by the quart. Similarly, because Mr. Volta discovered the principles involved in making chemical batteries, which create electrical pressure, we measure electrical pressure by volts, just as we would measure mechanical pressure by pounds. Because Mr. Ampere discovered much that we know about electrical current, we use his name as the unit of measurement of current.

Now we can re-state the problem this way: amperes $= \frac{\text{volts}}{\text{ohms}}$; ohms $= \frac{\text{volts}}{\text{amperes}}$; volts = amperes $\times$ ohms. A practical application of this law may show its value. An ordinary sixteen-candle-power incandescent lamp has a resistance of 220 ohms. It is known that half an ampere of current will have to flow through it to make it incandescent. What voltage will be required to produce this result? Go back to your rule, which shows that the voltage = current $\times$ resistance. Therefore, 110 volts pressure will be required.

If the student will try out a few of these examples for himself he will find them interesting, and they will show him the "reason why" for the resistances and pressures used, or where he knows the resistance and pressure, he can tell the amount of current.—*Postal Telegraph.*

Reunion of Former Indianapolis Messengers.

A reunion of former telegraph messenger boys in Indianapolis, Ind., now prominent business men, was held December 12, at the Denison Hotel, in that city. The "boys" were in the service in the late seventies and early eighties and they met in response to a suggestion of Mr. Thomas F. Chilton, of Petoskey, Mich., to talk over old times. The affair was so successful in all respects that it was decided to form a permanent organization to be known as the Indianapolis Messenger Boys' Association, to which all messenger boys shall be eligible. A committee of organization was appointed.

The association will meet once a year or oftener and will look after the interests of the present day messengers.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER XXIX.

How is the energy from the generators* conducted to the operating room at the top of a high building?

At the operating room how are the main leads from the generator room disposed of?

What size of wire should be used for the net work in the operating room?

Would it be advisable to use a wire of larger gauge for the operating room distribution than for the leads from the generator room?

Explain why.

What is the reason for using as large conductors as possible?

Describe the method of laying the wires in the operating room floor.

How are the operating tables connected with the loop switch?

How are the cables drawn through the floor trenches?

How are the wires and cables in trenches marked for identification?

CHAPTER XXX.

What is a fuse?

What is the purpose of using fuses in connection with telegraph apparatus?

Draw a diagram showing the multiple arrangement of instruments.

What is the fuse holder?

How many circuits should be fed from one fuse?

Why is it advisable to limit the number of connections to the fuse holder?

What is the advantage of connecting instruments to the fuse holder?

In selecting a fuse what is the basis upon which to determine the proper size?

If there is a demand for two amperes should a fuse melt with that current or should its fusing point be higher?

Give the reason.

What size fuse is generally used on circuits carrying two amperes?

What is the resistance of sounders generally used on loops?

*The term "generator" is the more modern name for "dynamo" and is used by electrical engineers.

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What disadvantage is there in using instruments of higher resistance?

Describe the plan of house wiring for a series system and point out the difference between it and that employed for the multiple system.

Refer to Fig. 70 and trace out the circuits and connections.

Why is a lamp or other form of resistance included in the grounded conductor connected with the right hand disk of the switch?

How can loops be made equal in resistance for the purpose of grouping?

Balancing Quadruplexes and Duplexes.

BY HENRY S. GILBERT, PUEBLO, COL.

I have read with much interest the articles of Mr. E. C. Dodge in your issue of November 1, and that of Mr. M. M. Davis in the December 1 issue, relative to balancing quadruplex and duplex apparatus. Possibly the description of a still different method might be of interest to your readers.

That there is unnecessary delay on nearly all multiplex circuits, due to waiting for the repeater chief at the distant end or the next repeater station to come in, there is no question. On some circuits bells are provided to call the repeater chief in, but on a majority of circuits they are not used. While it is possible to get a pretty good balance in the manner Mr. Dodge suggests, it is far from being a perfect balance. It is more or less guess work and extremely difficult for some persons who are inclined to be nervous to take a satisfactory balance in that way. While I do not use the ground switch for balancing, I firmly believe every quadruplex and duplex set should be provided with the customary ground switch, for the attendant can often locate the nature of instrument or line trouble by the use of the switch. It is true that the switch may be corroded and cause a higher resistance than that of the compensating coil, but I believe that as most quadruplex sets are wired so that the split wire from the neutral relay, polar relay and retardation coil goes to the transmitter points before reaching the ground switch, that the higher resistance is caused largely by the corroded points on the transmitter, both when open and closed. The fewer defective points the current has to traverse the quicker the trouble can be located. I believe that on all quadruplex and duplex sets the split wire should go direct to the ground-switch lever, then the distant office would not have to balance to any added resistance resulting from defective points on the transmitter. The practice of biasing one's relay to compensate for the imperfect balance at another station is inadvisable, for when the other office does take a balance, your magnetic balance is defective, and you are again called in, thus adding another delay. The use of galvanometers on quadruplex and duplex circuits is a great help, as it is only necessary to stop business for ten seconds to determine whether your electrical balance is correct or not, provided that it is merely a balancing of the circuit that is desired.

A method I have adopted for balancing quadruplex and duplex circuits without calling in the distant office or the next repeater station, and without the use of the ground switch, is by the use of the mil-ammeter, together with the open post on the latest type rheostats in the artificial line and the lightning arrester or main line fuse block of the set. It is a matter of a few seconds' time to throw the arm of the rheostat upon the open post, draw the fuse or remove the main line wire from the lightning arrester and center your polar relay armature. Then upon closing the main and artificial lines, place your mil-ammeter wedge between the second and third posts of the polar relay, operate your pole-changer, and at the same time readjust the resistance in the artificial line until no movement of the needle is noticeable. Your static balance can also be taken by the same method after a little practice. On a duplex set place the mil-ammeter wedge upon the first and fourth posts of the polar relay.

A balance by this method can be obtained after a little practice in less than one minute, and eliminates the delay from fifteen to twenty-five minutes in waiting for repeater stations to come in. A comparison of this method of balancing with that of the grounding balance will show the two to be identical.

If the distant station attendant is at his set the instant you are in, one might center the armature quicker by the ground switch method, but on long overland circuits where the repeater stations are called in, I believe the latter method quicker and better.

Among the appointments sent to the Senate by President Taft on December 12 were the following: Mr. B. H. Meyer, of Wisconsin, and Mr. C. C. McChord, of Kentucky, to be members of the Interstate Commerce Commission. Mr. Martin A. Knapp, chairman of the Interstate Commerce Commission, to be judge of the new Court of Commerce.

A telegraph operator of Denver is the inventor of a device which he claims will automatically overcome most of the difficulties which have in so many cases proved disastrous to aviators. By use of this invention he expects to make an aeroplane self balancing under any adverse conditions of wind. In case anything goes wrong with the aeroplane this device is expected to allow the machine to settle easily to the ground without any damage.

For the first time the leased wire of The Associated Press from Laredo, Tex., to Monterey and Mexico City, Mex., was seized by the Mexican Government on November 21, on the plea of military necessity. The Federal telegraph circuit manager in Nuevo Laredo was ordered to cut off the Laredo office of The Associated Press, in order to prevent the gleaning of information regarding the revolution in Mexico from messages moving over the wire.

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KERITE

Insulated wires and cables installed half a century ago are in service to-day.

1850

1910

KERITE INSULATED **WIRE AND CABLE CO.**

Incorporated by W. R. Brixey

Hudson Terminal, 30 **Church Street, New York**

Western **Representative:**
WATSON INSULATED WIRE CO., **Railway Exchange, Chicago, Ill.**

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New York, November 18, 1868.

To AUSTIN G. DAY, Esq.

Dear Sir:

I have been much gratified in hearing your explanation of KERITE. . . . Its quality or rather property of resisting the deteriorating causes which tend to destroy sooner or later the insulation by gutta percha, or caoutchouc, makes it an invaluable discovery in the aid of telegraphic extension. The test to which it has been submitted and by which it has been proved to resist the deteriorating effects of the ozone of the atmosphere appear perfectly satisfactory, and I therefore most cheerfully and cordially join with those who have tested its efficiency in congratulating you on your success in introducing so valuable an aid to the telegraphic enterprise of the world. . .

With hearty wishes for your success,

Your obedient servant,

(Sgd.) SAMUEL F. B. MORSE.

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¶ Fifty years of efficient service in installations on whose reliability both the safety and convenience of the public have depended have proved Kerite Insulation to be the safest, because it is the most reliable; and the most economical, because it is the most durable.

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

¶ Ask the people who have used it.

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Kerite

Insulated Wires and Cables are secure invest-ments yielding permanent service

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(Directory continued from page 34)

THE ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.

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

Place of next meeting, Boston, Mass., June 19, 20, 21, 22 and 23, 1911.

OFFICERS FOR 1910-11.

President, I. T. Dyer, Los Angeles, Cal.; first-vice-president, J. B. Sheldon, Omaha, Neb.; second vice-president, Wm. Bennett, Chicago, Ill.; secretary and treasurer, P. W. Drew, Chicago, Ill.

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Topics—Mr. W. C. Walstrum, Mr. W. L. Connelly, Mr. U. J. Fry.

SPECIAL COMMITTEES.

Committee on High Tension Wire Crossings—G. A. Cellar, G. H. Groce, W. W. Ashald, W. P. Cline, C. Selden, C. A. Parker, J. M. Walker, Wm. Bennett, S. A. D. Forristall, J. G. Jennings.

Committee on Miscellaneous Matters—W. F. Williams, S. L. Van Aiken, F. T. Wilbur, W. W. Ryder, George Boyce, B. F. Frobes.

Committee on Resolutions—W. W. Ryder, E. P. Griffith, E. J. Little.

Committee on Form for Delivery of Messages to Trains, etc.—E. P. Griffith, C. M. Lewis, W. J. Camp, Wm. Bennett, J. C. Johnson.

Entertainment Committee—S. A. D. Forristall, N. E. Smith, W. Marshall, M. Magiff, B. A. Kaiser, P. W. Miller, A. P. Eckert.

Ladies' Reception Committee—Mrs. C. F. Ames, Mrs. L. J. Shay, Mrs. Geo. W. Conway, Mrs. N. E. Smith, Mrs. M. Magiff, Mrs. S. A. D. Forristall.

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Wm. Bennett, Supt. Tel., C. & N. W., Chicago, Ill.
F. E. Bentley, Supt. Tel., T. R. R. Assn., St. Louis, Mo.
J. H. Brennan, Asst. Supt. Tel., St. L. & S. F., St. Louis, Mo.
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W. S. Fender, Asst. Supt. Tel., S. Pac., San Francisco, Cal.
B. F. Frobes, Supt. Tel., O. S. L., Salt Lake City, Utah.
U. J. Fry, Supt. Tel., C. M. & St. P., Milwaukee, Wis.
J. W. Fry, Asst. Supt. Tel., C. M. & St. P., Seattle, Wash.
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The object of this association shall be the acquisition of experimental, statistical and scientific knowledge relating to the construction, equipment and operation of fire and police telegraph, light, heat and power systems, and the diffusion of this knowledge among the members of this association with a view of improving the service and reducing its cost; and the establishment and maintenance of a spirit of fraternity among its members.

Place of next meeting, St. Paul, Minn., 1911, at a date to be selected later.

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M. W. Rayens, president.

Dr. Edward Weston Honored.

At a dinner given at the Lotos Club, New York, on the night of December 16, Dr. Edward Weston, of Newark, N. J., was presented with the Elliot-Cresson gold medal recently awarded to him by the Franklin Institute, Philadelphia. The presentation was made by Dr. Robert B. Owens, secretary of the Institute. Among those present were Dr. Louis Duncan, Dr. F. B. Crocker, Professor C. F. Chandler, Dr. C. F. Brackett, Professor D. C. Jackson, Dr. Alexander C. Humphries, Dr. Charles P. Steinmetz, Dr. S. W. Stratton, Colonel Samuel Reber, and Messrs. Gano S. Dunn, L. A. Osburn, William Stanley, J. J. Carty, Charles W. Price, W. D. Weaver, Samuel Insull, W. C. L. Eglin and Ralph W. Pope.

Dr. Weston is one of the pioneers in the electrical arts and has done much valuable work in the development of the electric lamp, electric generator, in electro-metallurgy, etc., and is the founder and active head of a great industry which manufactures electrical measuring instruments. For his valuable scientific and practical achievements, he has been honored with degrees from Stevens Institute of Technology, McGill University and Princeton University.

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LORAIN, O., Western Union, W. G. Bliss, Postal, F. W. Krock.

LOS ANGELES, CAL., Western Union, G. A. Lawrence, Postal, J. H. Dorsey.

LOUISVILLE, KY., Western Union, Charles Smith, Postal, L. W. Janes.

LOWELL, MASS., Western Union, Z. E. Bissonnette, Postal, William Morris.

LYNN, MASS., Western Union, J. H. Lang, Postal, George L. Bowser.

LYNCHBURG, VA., Western Union, W. M. Odnay, Postal, R. H. Cheatham.

McKEESPORT, PA., Western Union, Miss E. R. McElwee, Postal, Miss L. B. Callaghan,

MACON, GA., Western Union, H. A. Carroll, Postal, O. T. Moore.

MADISON, WIS., Western Union, W. H. Murray, Postal, C. P. O'Brien.

MALDEN, MASS., Western Union, W. M. Corbin, Postal, J. L. Stein.

MANCHESTER, N. H., Western Union, Chas. J. Abbott, Postal, Fred J. Dickey.

MANSFIELD, O., Western Union, Chas. W. Mitchell, Postal, Harry D. Brenner.

MARION, IND., Western Union, Fred F. Rhorer.

MEMPHIS, TENN., Western Union, G. E. Woods, Postal, C. H. Johnson.

MERIDEN, CONN., Western Union, J. W. Gaffey, Postal, J. C. Churchill.

MILWAUKEE, WIS., Western Union, Fred A. Mohr, Postal, C. A. Comstock.

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MINNEAPOLIS, MINN., Western Union, L. F. Wise.

MOBILE, ALA., Western Union, C. R. Hughes, Postal, W. R. Hurst.

MOLINE, ILLS., Western Union, C. B. Foster, Postal, E. W. Schieberl.

MONTGOMERY, ALA., Western Union, J. W. Ware, Postal, William A. Sheppard.

MOUNT CLEMENS, MICH., Western Union, Fred G. Brown, Postal, J. H. Westendorf.

MOUNT VERNON, N. Y., Western Union, W. M. Brown, Postal, L. B. Wheeler.

MUNCIE, IND., Western Union, F. G. Bromm, Postal, F. O. Hawkins.

MUSKEGON, MICH., Western Union, W. J. Miles, Postal, W. D. Thorne.

NASHUA, N. H., Western Union, John Steele, Postal, Frank E. Heeley.

NASHVILLE, TENN., Western Union, A. H. Stewart, Postal, A. P. Martin.

NEW ALBANY, IND., Western Union, Geo. H. Godfrey, Postal, J. F. Grubbs.

NEWARK, N. J., Western Union, William H. Spry, Postal, J. F. Coogan.

NEWARK, O., Western Union, R. L. Rhodes, Postal, D. M. Becksted.

NEW BEDFORD, MASS., Western Union, W. F. McClure, Postal, N. S. McDonald.

NEW BRITAIN, CONN., Western Union, M. A. Floh, Postal, A. S. Hall.

NEW BRUNSWICK, N. J., Western Union, J. S. Fowler, Postal, William L. Kearney.

NEWBURG, N. Y., Western Union, C. H. Diehl, Postal, A. F. Post.

NEWCASTLE, PA., Western Union, Louis Eisenburg, Postal, C. A. Strang.

NEW HAVEN, CONN., Western Union, Simon E. Lonergan, Postal, N. C. Hall.

NEW LONDON, CONN., Western Union, Charles L. Fitchthorn, Postal, F. Orchard.

NEW ORLEANS, LA., Western Union, W. A. Porteous, Postal, William C. Lloyd.

NEWPORT, KY., Western Union, Miss Mary McCabe, Postal, Edward Kauffman.

NEWPORT, R. I., Western Union, F. O. Dwyer, Postal, L. N. Boone.

NEWPORT NEWS, VA., Western Union, A. H. Cheek, Postal, H. L. Bush.

NEWTON, MASS., Western Union, E. L. Murphy.

NEW YORK, Western Union, T. A. McCammon, District Traffic Superintendent, Postal, J. J. Whalen.

NIAGARA FALLS, N. Y., Western Union, Charles H. Simpson, Postal, W. J. Martan.

NORFOLK, VA., Western Union, L. C. Hall, Postal, H. A. Lanier.

NORRISTOWN, PA., Western Union, E. A. Leopold, Postal, H. M. Bolton.

NORTH ADAMS, MASS., Western Union, H. G. Nichols, Postal, W. F. Orr.

OAKLAND, CAL., Western Union, F. Aubertin, Postal, John R. Clark.

OGDEN, UTAH, Western Union, W. J. Dermody, Postal, W. S. O'Brien.

OGDENSBURG, N. Y., Postal, F. M. Moss.

OMAHA, NEB., Western Union, W. W. Umsted, Postal, J. G. Wolf.

ORANGE, N. J., Western Union, W. J. Riordan, Postal, L. C. Delahanty.

OSHKOSH, WIS., Western Union, Arthur H. Allen, Postal, J. N. Chase.

OSWEGO, N. Y., Western Union, James P. Doyle, Postal, L. A. Metzger.

PADUCAH, KY., Western Union, S. G. Quisenberry, Postal, W. L. Muker.

PASSAIC, N. J., Western Union, C. F. H. Johnson, Postal, G. S. Richtmyer.

PATERSON, N. J., Western Union, D. L. Doran, Postal, E. J. McCabe.

PAWTUCKET, R. I., Western Union, K. G. Leary, Postal, H. C. Knowles.

PENSACOLA, FLA., Western Union, L. R. Daniel, Postal, J. M. Martin.

PEORIA, ILLS., Western Union, William Howard, Postal, F. H. Jacob.

PETERSBURG, VA., Western Union, George A. Lanier, Postal, V. H. Borst.

PHILADELPHIA, PA., Western Union, R. A. Black, Postal, J. A. McNichol.

PITTSBURG, Pa., Western Union, E. Ross Collins, Postal, A. W. Rhinehart.

PITTSFIELD, MASS., Western Union, L. H. Jordan, Postal, R. H. Mason.

PORTLAND, ME., Western Union, H. H. White, Postal, C. C. Ramsay.

PORTLAND, ORE., Western Union, W. A. Robb, Postal, J. Annand.

POUGHKEEPSIE, N. Y., Western Union, George H. Card, Postal, F. W. Towne.

PROVIDENCE, R. I., Western Union, Phillip S. Carey, Postal, George H. Mills.

PUEBLO, COLO., Western Union, W. F. Drake, Postal, L. Van Arsdale.

QUINCY, ILLS., Western Union, E. W. King, Postal, F. L. Martin.

QUINCY, MASS., Western Union, A. W. Mitchell.

RACINE, WIS., Western Union, J. C. Dorchester, Postal, Herbert F. Wheeler.

READING, PA., Postal, W. T. Phillips.

RICHMOND, IND., Western Union, A. A. Burr, Postal, F. J. Cunningham.

RICHMOND, VA., Western Union, A. C. Stevenson, Postal, C. T. Sydnor.

ROANOKE, VA., Western Union, J. F. Terrell, Postal, J. H. Benton.

ROCHESTER, N. Y., Western Union, G. D. Butler, Postal, R. J. Little.

ROCKFORD, ILLS., Western Union, F. E. Buchanan, Postal, J. H. O'Donnell.

ROME, N. Y., Western Union, Edmund G. Mason, Postal, Edgar J. Nerburn.

SACRAMENTO, CAL., Western Union, J. M. Green, Postal, J. K. Beede.

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SAGINAW, MICH., Western Union, E. A. Patterson, Postal, J. W. Robinson.

SANDUSKY, O., Western Union, E. W. Grope, Postal, F. J. Shaffer.

ST. JOSEPH, MO., Western Union, J. A. Crawford, Postal, W. G. Brimson,

ST. LOUIS, MO., Western Union, R. H. Bohle, Postal, William S. Daniel.

ST. PAUL, MINN., Western Union, C. A. Crane.

SALEM, MASS., Western Union, J. R. Story, Postal, C. F. Skelley.

SALT LAKE CITY, UTAH, Western Union, H. A. Knight, Postal, C. B. Turpin.

SAN ANTONIO, TEX., Western Union, J. L. Newton.

SAN FRANCISCO, CAL., Western Union, W. A. Newcome, Postal, J. B. Coggins.

SAN JOSE, CAL., Western Union, J. R. Bailey, Postal, W. C. Harris.

SAVANNAH, GA., Western Union, W. B. Stuart, Postal, W. T. Austin.

SCHENECTADY, N. Y., Postal, F. W. Baumgras.

SCRANTON, PA., Western Union, W. H. Collins, Postal, J. O. Baskerville.

SEATTLE, WASH., Western Union, J. F. Rawie, Postal, J. J. Dunne.

SHEBOYGAN, WIS., Western Union, G. P. Stark, Postal, F. W. Scherman.

SHREVEPORT, LA., Western Union, J. P. Rohling.

SIOUX CITY, IOWA, Western Union, J. P. O'Donnell, Postal, F. E. Parham.

SOMMERVILLE, MASS., Western Union, F. J. Nicoll, Postal, A. L. O'Connor.

SOUTH BEND, IND., Western Union, B. J. Graybill, Postal, L. McNeff.

SOUTH OMAHA, NEB., Western Union, N. B. Mead.

SPOKANE, WASH., Western Union, B. S. Jones, Postal, D. Fletcher.

SPRINGFIELD, ILL., Western Union, J. B. Inman, Postal, Charles Stewart.

SPRINGFIELD, MASS., Western Union, Thomas Atkinson, Postal, P. J. Macken.

SPRINGFIELD, MO., Western Union, E. H. Rippey.

SPRINGFIELD, O., Western Union, T. E. Jones, Postal, C. A. Winston.

STOCKTON, CAL., Western Union, J. H. Sharon, Postal, S. F. Osborn.

SUPERIOR, WIS., Western Union, William R. Hollis.

SYRACUSE, N. Y., Western Union, J. E. Bierhardt, Postal, J. W. Weed.

TACOMA, WASH., Western Union, R. R. Sprinkle, Postal, J. M. Bell.

TAUNTON, MASS., Western Union, F. B. Shaw, Postal, W. C. Cassidy.

TERRE HAUTE, IND., Western Union, R. E. Scorah, Postal, Frank N. Broad.

TOLEDO, O., Western Union, F. J. Krumling, Postal, A. L. Lafferty.

TOPEKA, KAN., Western Union, W. C. Carswell, Postal, A. D. Matthews.

TRENTON, N. J., Western Union, C. J. Swartz, Postal, E. P. Cooper.

TROY, N. Y., Western Union, I. W. Copeland, Postal, Marshall L. Barnes.

UNION STOCK YARDS, ILL., Western Union, J. E. Applegate, Postal, C. S. Haskill.

UTICA, N. Y., Western Union, F. E. Howell, Postal, C. F. Lawlor.

VICKSBURG, MISS., Western Union, Ozro Stanley, Postal, R. C. Hackett.

VINCENNES, IND., Western Union, John R. Clark, Postal, F. T. Himler.

WACO, TEX., Western Union, A. S. McCollum.

WALTHAM, MASS., Western Union, L. B. White.

WASHINGTON, D. C., Western Union, H. F. Taff, Postal, F. B. Travis.

WATERBURY, CONN., Western Union, G. H. Baudim, Postal, M. M. Hunter.

WATERTOWN, N. Y., Western Union, C. E. Comstock, Postal, F. D. Haynes.

WHEELING, W. VA., Western Union, H. Young, Postal, E. Y. Ouderkirk.

WICHITA, KANS., Western Union, E. J. Sullivan, Postal, F. Johnson.

WILKES-BARRE, PA., Western Union, Eugene E. Cowell, Postal, B. F. Ziegler.

WILLIAMSPORT, PA., Western Union, S. G. Smith, Postal, G. E. Sornberger.

WILMINGTON, DEL., Western Union, Samuel Gray, Postal, W. W. Anderson.

WILMINGTON, N. C., Western Union, E. T. Moore, Postal, W. H. Stansell.

WINONA, MINN., Western Union, H. B. Thornton.

WOONSOCKET, R. I., Western Union, R. M. Barry, Postal, I. E. Bolton.

WORCESTER, MASS., Western Union, Peter Cunningham, Postal, F. N. Cooke.

YONKERS, N. Y., Western Union, Miss B. Melot, Postal, A. J. Collier.

YORK, PA., Western Union, G. O. Bentz, Postal, R. W. Buckingham.

YOUNGSTOWN, O., Western Union, F. W. Taylor, Postal, C. A. Mathany.

ZANESVILLE, O., Western Union, C. E. Jones, Postal, O. Y. Leasure.

MEXICO.

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

The telegraph system of Mexico embraces 36,133 kilometers of aerial lines, and 74,254 kilometers of wire, and about 7 kilometers of underground cable. It also comprises 745.5 kilometers of submarine cable and 17.5 kilometers of subfluvial cable.

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The Railroad.

The value of the telephone method of dispatching trains has been demonstrated by the behavior of this system on the Pere Marquette Railroad during recent sleet storms. The telegraph was put out of commission, but the telephone circuit worked continuously. Telephones have been installed at thirty way-stations and four sidings. The Michigan Central Railroad has recently installed train dispatching telephone circuits between Jackson, Mich., and Niles, Mich., 105 miles, with thirty-four telephone stations; between Jackson and Bay City, Mich., 115 miles, with twenty-three stations, and Jackson and Grand Rapids, Mich., 94 miles, with twenty-one stations. Equipment has been ordered for a telephone line between Windsor and St. Thomas, Ontario, 111 miles, with twenty stations.

Mr. E. L. Myers, for eight years general foreman of telegraph for the Mexican Central Railway, has been appointed chief electrician in charge of telegraph construction and maintenance, electric lighting and car lighting for the same company, at Mexico City.

Mr. G. O. Perkins, superintendent of telegraph of the National Railways of Mexico, at Mexico City, has been appointed superintendent of telegraph of the Chicago Great Western Railroad, with headquarters at Chicago, succeeding Mr. A. T. Hollenbeck, who has been assigned to other duties. Mr. Perkins was born in Beloit, Wis., September 29, 1866, and began his telegraphic career in Quincy, Ill., in 1882. He was at one time superintendent of news service for the United Press of Chicago, and later superintendent of telegraph of the Mexican Central Railway, Mexico. He afterwards occupied the position of superintendent of telegraph of the National Railways of Mexico, which he now relinquishes to return to the United States.

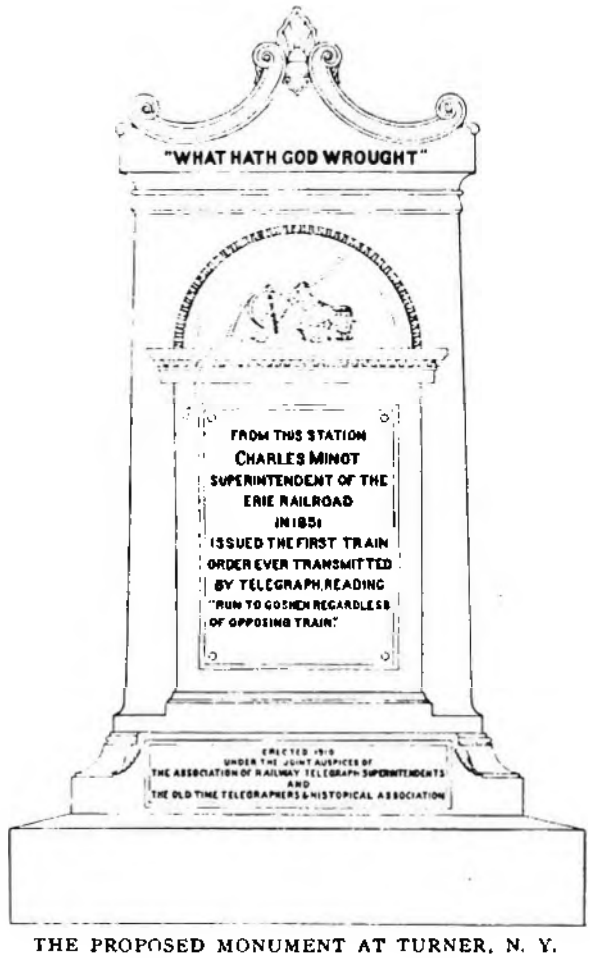
Mr. Antonio Jimenez has been appointed superintendent of telegraph of the National Railways of Mexico, to succeed Mr. G. O. Perkins, resigned.

Mr. Frank N. Dowler, city freight agent for the Lackawanna Railroad, New York, is a former telegrapher. He entered the telegraph service at Perrysburg, Ohio, and was afterwards operator in various Toledo, Ohio, offices in the middle seventies and early eighties. He was afterwards manager of the Atlantic and Pacific Telegraph Company's office in the same city. From 1890 to 1900 Mr. Dowler was general agent for the "Clover Leaf" Railroad. Mr. Dowler is a member of various telegraph associations and is well known to telegraphers throughout the country.

"Jack" Binn's Name.—Protection against the use of his name for advertising purposes was granted by the appellate division of the Massachusetts supreme court to "Jack" Binns, the wireless operator, whose "C. Q. D." message called help to the sinking steamship *Republic* in January 1909. An order was issued restraining a moving picture firm from using Binns' name on films portraying the wreck of the vessel.

The Turner Monument Fund.

The Turner Monument Fund is growing very satisfactorily and there is every reason to believe that after the holidays contributions will be made with greater liberality and freedom. As has been already explained the purpose of this fund is to erect a bronze and granite monument at Turner, N. Y., from which point, the first telegraph train order was sent by Charles Minot, general superintendent of the Erie Railroad, in the autumn of 1851. The monument will cost about $3,000 and to defray the expenses, subscriptions are invited from all



THE PROPOSED MONUMENT AT TURNER, N. Y.

railroad and telegraph men. The Association of Railway Telegraph Superintendents and the Old Time Telegraphers' and Historical Association have given the proposition their official endorsement and are heartily co-operating in the work of raising the necessary funds. All contributions are acknowledged in the columns of Telegraph and Telephone Age. The following named gentlemen constitute the committee in charge of the Monument Fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chen-

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ery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. Many who have already contributed towards the fund express their willingness to make further contributions, if necessary.

An illustration of the proposed monument is given together with a description.

DESCRIPTION OF THE MONUMENT.

Material—Granite, and two tablets of bronze. Above the tablet on the front face is a fac-simile of the original Morse register. The tape bears the characters of the first train order, "Run to Goshen Regardless of Opposing Train."

Dimensions:

	Width Ft. In.	Thickness Ft. In.	Height Ft. In.
Base	7.0	4.6	1.4
Die-block	4.6	2.0	6.4
Sub-base	5.6	3.0	1.0
Cap	4.5	1.11	2.6
Total Height			11.2

The lettering is raised and has polished faces.

The contributions received up to date are as follows: Previously acknowledged $609.50.

Henry Adams, New York, $5.00; J. Merrihew, New York, $5.00; D. Roth, New York, $1.00; M. Nolan, Port Jervis, N. Y., $1.00; E. F. Meredith, Jersey City, N. J., $1.00; Miss A. Heuser, Passaic, N. J., $1.00; A. G. Saylor, New York, $5.00; H. B. Pigman, Connellsville, Pa., $1.00; W. R. Clasper, Connellsville, Pa., $1.00; Shenandoah Division Operators, B. & O., J. C. Smith, dispatcher, Winchester, $1.00; W. R. Smith, dispatcher, Winchester, $1.00; M. B. Murnam, dispatcher, Winchester, $1.00; J. R. Darlington, operator, Strasburg Junction, $1.00; O. L. Marks, operator, Lexington, $1.00; E. C. Houser, operator, Lexington, $1.00; A. W. Hawne, operator, Lexington, $1.00; P. S. Rogers, operator, East Lexington, $.25; W. C. Yates, operator, East Lexington, $.25; E. E. Rogers, operator, Middletown, $.25; D. L. Host, T. M. & C. T. D., Columbus, O., H. S. Conley, dispatcher, Columbus, O., J. F. Sutherland, dispatcher, Columbus, O., F. W. Fisher, dispatcher, Columbus, O., O. G. Geil, dispatcher, Columbus, O., $3.00; C. Christie, Watertown, N. Y., $2.00; John Egan, San Francisco, Cal., $1.00; Mrs. M. C. Gates, New York, $1.00; F. N. Shultz, Garrett, Ind., $.50; W. O. Keefe, Garrett, Ind., $.50; H. S. Carroll, Garrett, Ind., $.50; W. H. Cavers, North Bay, Ont., Can., and W. C. Newman, North Bay, Ont., Can., $.50; A. W. Mombert, New York, $2.00; U. J. Fry, Milwaukee, Wis., $2.00; W. A. Pfeil, New Castle, Pa., $1.00; W. P. Cahill, New Castle, Pa., $1.00; E. C. Bock, New Castle, Pa., $1.00; W. J. Lloyd, Chicago, Ill., $5.00; F. W. Brindle, Paterson, N. J., $1.00; J. Fitzgibbons, Middletown, N. Y., $1.00; J. E. Cleary, Middletown, N. Y., $.50; Geo. D. Reynolds, Middletown, N. Y., $.50; John McNearney, Middletown, N. Y., $.50; J. M. Hurky, Arlington, N. J., $1.00; J. W. English, New York, $1.00. Total $664.75.

Postal Christmas Frolic.

On Friday afternoon, December 23, the officers and employes of the Postal Telegraph-Cable Company enjoyed their annual Christmas entertainment and frolic in the reception room of the executive offices, 253 Broadway, New York.

The room was very attractively decorated for the occasion, Christmas greens, bells, etc., being plentifully used. A good time was had by all present, and every one was remembered in the way of favors.

Mr. C. H. Mackay was presented with a miniature lantern, tagged, "Let your light so shine before men that they may dodge your motor car."

Mr. E. J. Nally, received a wheelbarrow, marked, "Lo, he that expecteth nothing but junk shall not be disappointed, but he that yearneth for an aeroplane shall peradventure receive a wheelbarrow."

Mr. C. C. Adams, got a paper cigar of generous size. This was tagged, "A cigar in the mouth is worth two in the shop."

Mr. C. P. Bruch received a toy dog, to which was attached two anchors. "It is well to moor your bark with two anchors," was the inscription.

Mr. W. I. Capen got a miniature telegraph line, also a hank of clothesline marked, "The family line that is the most useful but never bragged about is the one where the wash is hung, but the real thing in lines is the Postal Telegraph sample attached."

Mr. C. F. Leonard received two small dolls, inscribed, "He that kids others must stand some kids back."

Mr. E. Reynolds was presented with a large Bermuda onion which was tagged, "If you have tears to shed, prepare to shed them now."

Mr. E. B. Pillsbury got a doll's hair brush. "A hair on the head is worth two in the brush."

Mr. M. M. Davis received a doll's house, "Ohm, sweet ohm."

Mr. J. F. Skirrow received an automobile marked, "He that speeds and runs away may live to be nabbed some other day."

Mr. F. F. Norton received a miniature watch, inscribed, "The S. R. S. Service is all right but you need a watch to catch the ferry."

No one was overlooked, not even the editor of Telegraph and Telephone Age, who received a hatch of clippings, a pair of scissors, a blue pencil and bottle of ink emblematic of his functions, tagged:

"There once was an editor, and what do you think?
"He lived on nothing but clippings and ink.
"Clippings and ink were the chief of his diet,
"And yet this same editor scarce ever was quiet."

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Miss T. N. Brown, of the general manager's office, ably assisted by others connected with this department, is entitled to the credit for this unique entertainment which was thoroughly enjoyed by all present.

The Robert W. Martin Fund.

In contributing toward the fund for the relief of Mr. Robert W. Martin, who has been in bed for several years past, suffering from a paralytic stroke, Mr. E. B. Pillsbury, general superintendent of the Postal Telegraph-Cable Company, New York, says: "I have just read your reference to Bob Martin in Telegraph and Telephone Age, and although his name and fame are but traditions to me, as I never knew him, I am glad to enclose $5.00 to add to the fund for his relief." Other amounts received toward the fund are as follows: Charles P. Bruch, third vice-president Postal Telegraph-Cable Company, $500; W. J. Lloyd, division traffic superintendent Western Union Telegraph Company, Chicago, $5.00; T. Lynch, Pittston, Pa., $2.00, all of which has been turned over to Mrs. Martin.

Mr. D. A. Mahoney, 203 Broadway, New York, makes a specialty of handling factory rebuilt typewriters for operators. Being an operator himself he knows all the requirements. He is well known in the telegraph trade for his fair dealing, and for the past twenty years has been placing "mills" with telegraphers. Mr. Mahoney would be pleased to hear from any one who wishes a rebuilt machine or desires to have his old one put in first-class order.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, WESTERN UNION.

Thomas C. Egan, a well-known and expert telegrapher, died at his home in Detroit, Mich., November 26, after an illness of three months.

Mr. Wm. Keefer Bennett, one of the oldest and best-known telegraphers in Texas, died suddenly at his desk in the Houston, Tex., Western Union office on November 14. He was 42 years of age, and was a brother of Mr. H. L. Bennett, superintendent of telegraph of the Houston and Texas Central Railroad.

BALTIMORE, WESTERN UNION.

The following appointments and promotions in this office became effective December 1: Mr. C. E. Clagett to be plant chief; Mr. R. L. Dryden, to be wire chief; Mr. R. G. Simmons, to be assistant wire chief vice R. L. Dryden, promoted; Mr. H. E. Hess, assistant night wire chief; Mr. J. W. Waller, all night chief vice R. G. Simmons, promoted; Mr. Alex. Moore, night traffic chief, vice J. W. Waller, promoted, and Mr. Wm. Mallonee, assistant day traffic chief.

PHILADELPHIA, POSTAL NOTES.

Chief Operator Earl W. Miller was married to Miss Jessie M. Vivian on December 16. After their honeymoon the couple will reside in West Philadelphia. A handsome book case was presented by the officials and employes of the office.

Mr. H. W. Hetzel, chief clerk to Superintendent Bagley, has resigned to accept a position as traveling auditor for the company. His friends presented him with a traveling bag.

Mr. W. P. Bowers, formerly manager of the Record office, has succeeded Mr. J. D. Prosser as night traffic chief.

Among recent visitors at this office were Mr. James P. O'Donohue, division electrical engineer, and Mr. D. H. Gage, Jr., of the electrical engineer's department, New York.

Mr. J. Jerome O'Neill has been appointed chief clerk to Superintendent C. E. Bagley.

PITTSBURG, WESTERN UNION.

The Electrical Society held a special session for the purpose of arranging a course of study for the ensuing year. Mr. George H. Kendrick, electrician of the Company, was appointed instructor of the Society to lecture upon the practical and technical points of the telegraph. The first regular session of the course is scheduled for the first week in January. Great interest and enthusiasm was manifested by all the members present. Mr. F. E. Schiller, vice-president of the Society, occupied the chair.

Mr. J. A. Larimore, chief operator of the Western Union office, Pittsburg, Pa., whose appointment was briefly announced in the December 16 issue, has been in the service of the company for many years, occupying positions as traffic chief, night chief operator, and wire chief, serving in the latter capacity at the time he was appointed chief operator. Mr. Larimore is thoroughly familiar and devoted to the interests of the company and upon entering his new duties, carries with him the good will and best wishes of all his associates.

MAHONEY! A name synonymous with honesty and fairness respecting typewriters and typewriter rebuilding. Your name in GOLD on Phillips' Code $1.15. D. A. Mahoney, Room 705, 203 Broadway, New York.

NEW YORK, POSTAL.

Percy W. DeBaum, traffic chief in this office, died December 18, of typhoid fever. Deceased was only twenty-three years of age and was held in high esteem by the officials of the company and his associates.

Miss Annie Niemann, a telegraph operator in the Postal Telegraph-Cable Company's office at Germantown, Philadelphia, distinguished herself a few days ago by refusing to leave her key until she had finished sending a message, while the building was on fire. She was nearly suffocated, but has since recovered.

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Obituary.

Augustus Schnell, aged 74, died at Des Moines, Ia., November 30, and A. C. Schnell, a brother of Augustus, died at Guthrie, Okla., December 8. The latter was an old-time telegrapher and a member of the United States Military Corps during the Civil War. There were five of the Schnell brothers, and all of them enlisted for service during the Civil War, three of them in the military telegraph service and two of them were soldiers. The surviving members are Thad M., Joseph and James Schnell. Thad M. Schnell is still actively engaged in the telegraph service at Des Moines, Ia.

Assessments Nos. 517 and 518 have been levied by the Telegraphers' Mutual Benefit Association, to meet the claims arising from the deaths of W. J. Bodman, at Buffalo, N. Y.; A. B. Churchill, at Boston, Mass.; H. A. Sheldon, at New York; J. Weber, at Liberty, N. Y.; M. D. Jones, at Goshen, Ind.; J. Watson, at Northville, Minn.; C. M. Coven, at Atlanta, Ga.; J. D. Voltz, at South Elgin, Ills.; L. M. Johnston, at Montgomery, Ala., and T. Nelson, at Tomah, Wis.

Magneto Telephone Sets and Accessories is the title of a forty-page pamphlet issued by the Western Electric Company. It is profusely illustrated and is a comprehensive exposition of the subject.

Wireless Operators' Head Receiver.

The most important points to be considered in the selection of wireless telephone receivers are sensitiveness, comfort and permanence of adjustment and construction. The head receivers manufactured by the Holtzer-Cabot Electric Company, Boston, Mass., have been designed with these points in view. The windings are of silk covered copper wire and the magnets are made from a special quality of steel and are of the proper strength to give best results with the diaphragms used. The spools and magnets are mounted in a metal cup which supports the diaphragm and the cores are ground to a proper height so that the adjustment is permanent. The metal cup is enclosed in a hard rubber shell. The two receivers are mounted on an adjustable leather covered head band.

Large pneumatic rubber cushions are provided with each set, which not only shut out extraneous noises but also make the set more comfortable to wear. These cushions are readily detachable.

These sets may be wound to resistances up to 4,000 ohms.

DISAPPEARED

Information wanted as to the present whereabouts of William H. Bogar, a telegrapher. Last heard of at Hopkins, Michigan; formerly of Armington, Illinois. Important to him or his family. Write

JOHN D. SAGE, Box 892, Cincinnati, O.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, combines fraternalism with sound business principles; it offers to the telegraph and telephone employe an absolutely safe form of protection, at a cost within the reach of all and lower than can be found elsewhere. Membership only open to employes in commercial or railroad telegraph or telephone service, and it is manifestly to the interest of those who are eligible and wish to secure life insurance within their means, to secure without delay a certificate for $1,000 or $500, or both, at rates based on present age.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, is conducted for the benefit of employes of the telegraph and telephone services; primarily, to enable them to purchase a home on easy terms and, secondarily, to encourage the habit of thrift. What is paid now for rent goes toward the payment for a house. The great advantage is you own your house and yet it costs no more than paying rent to a landlord for the use of his property. Particulars of the Institution's plan will be cheerfully given by addressing the Secretary, 195 Broadway, New York.

MARTIN'S LATEST VIBROPLEX, $9.00. Address James B. Havice, General Agent, 253 Broadway, New York.

Absolutely the best values in factory-rebuilt typewriters, all makes. Rebuilding and repairing by first class workmen only.

Postal employes may purchase typewriters or have their machines rebuilt by negotiating with the Mutual Investment Association upon payment of 75 cents weekly. We invite correspondence. Central Typewriter Exchange, D. A. Mahoney, Representative, 203 Broadway, New York.

WANTED: An agent in each Western Union and Postal office to represent us. Please address, Central Typewriter Exchange, 203 Broadway, New York.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

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.

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Telegraph and Telephone Age

No. 2. NEW YORK, JANUARY 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY—X.

A Study of Telegraph Apparatus.

BY WILLIS H. JONES.

NEWSPAPER LOOP COMBINATION SETS.

As the loops connected with the various newspaper offices are as liable to be called for on duplex as on single-line circuits it is necessary to arrange the apparatus in such a manner that the operator will be able to utilize the same set of instruments for each class of work. This he accomplishes by merely shifting the levers of his three-point switch to the right or left as the occasion requires. Figs. 1 and 2 show the connections and positions of the outfit required for gravity and storage local battery respectively.

The sounders employed are usually of the four-ohm pattern for the reason that when connected for duplex work they should correspond with the type used in the main-office multiplex apparatus which latter, for Western Union Telegraph service, is invariably four-ohm winding.

Another reason for the low wound instrument is that it requires a less number of gravity cells of battery to operate it when the local circuit is switched through the relay contact points for single line work than higher wound sounders would require. However, higher wound sounders may be, and in fact are, used by the Postal Telegraph-Cable Company for this service where a higher voltage for local circuits is provided. In either case the local battery in the newspaper office must be arranged to furnish approximately the same amount of current to the sounder when the latter is operated by the relay that the main office supplies it with when in series with the duplex or quadruplex local apparatus. Otherwise the operator in switching from one class of service to the other might find it necessary to readjust his sounder on each occasion.

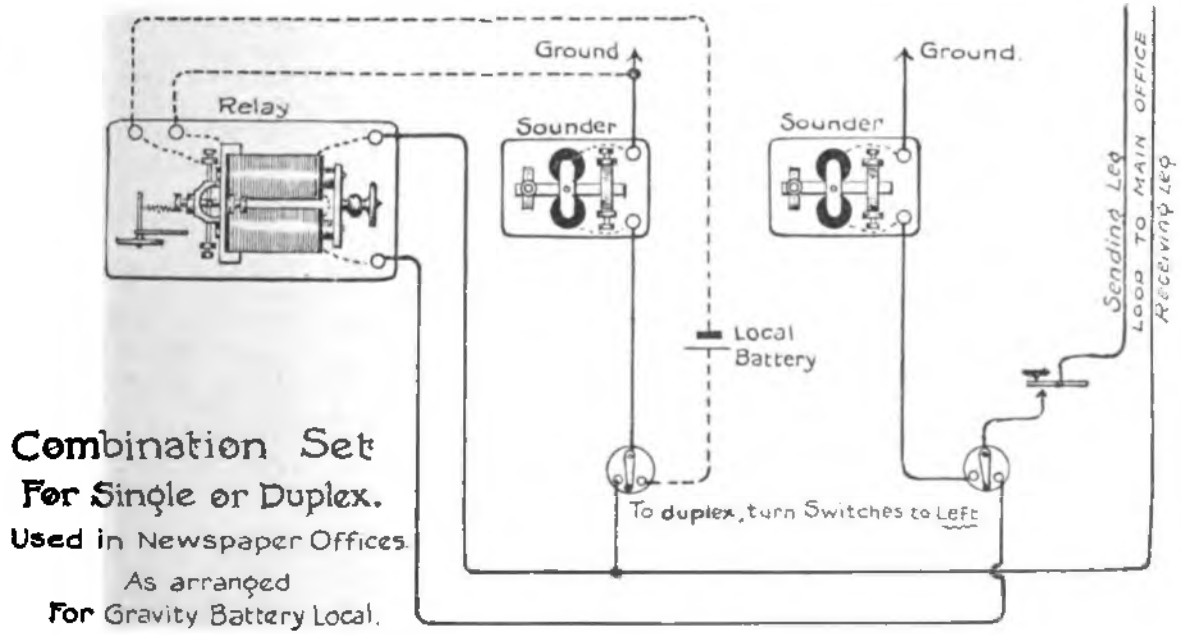

FIG. 1. CONNECTIONS OF COMBINATION SET FOR GRAVITY BATTERY.

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It will be seen by a glance at Fig. 1 that instead of the gravity local battery being placed in a metallic circuit, as it usually is for relay operation, one pole of the cell or cells is grounded. This method is used in order that when the relay is not in service and the sounder has been connected with the duplex apparatus, the loop conductor will remain closed through the sounder. Otherwise that particular sounder would receive no current from the main office battery, as the circuit would then be open at the relay contact points.

It will also be seen that when the newspaper operator "duplexes" his loop, it is no longer a loop proper, but two single circuits terminating in a ground wire at that point, one half of the loop being used for the sending side and the other half for the receiving side. When, however, he "singles," he removes the "ground" and shifts the circuit through the coils of the single line relay; both conductors then become part of the main line circuit in which the loop is connected, and one of the sounders responds to the actions of the relay contact points in the usual way.

Fig. 2 shows the local connections where storage battery is employed. The other connections are, of course, the same as those in Fig. 1.

Combination sets of this kind can only be used at terminal offices, as intermediate offices can not "single" or "duplex" the loop, even if provided with switches, without cutting off the stations beyond, hence they are used very little except in newspaper offices.

The conductors for newspaper loops are built up by means of artificial resistance, usually resistance lamps, to a uniform value, say 100 ohms, that is to say 100 ohms in each half of the loop in order that the sending and the receiving side when "duplexed" will take the same amount of current.

As some newspapers are at a greater distance from the main office than others, and as the loops obviously possess a greater resistance than the shorter conductors, different size lamps are required for the purpose of evening them up. These lamps are inserted in sockets behind the loop-switch board as explained in a previous installment of this series of articles.

The operator in the newspaper offices gets his instructions to "single" or "duplex," as the occasion requires, over a "call wire" in which all the other newspaper offices are connected.

Newspaper combination sets give very little trouble where the operators are careful about shifting the switch levers and avoid reversing the wedge cords. (To be continued.)

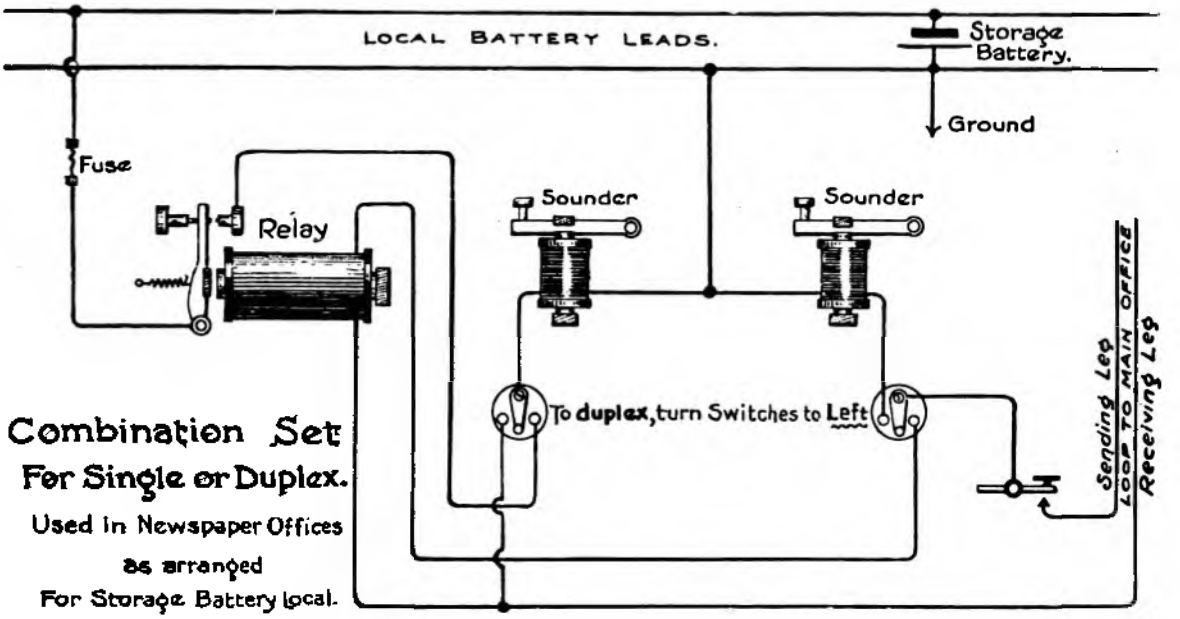

FIG. 2. CONNECTIONS OF COMBINATION SET FOR STORAGE BATTERY.

Recent Telegraph and Telephone Patents.

ISSUED DECEMBER 19, 1910.

978,849. Harmonic Party Line Telephone Ringer, to C. J. Erickson, Chicago, Il.

978,909. Composite Telephone and Telegraph System, to O. M. Leich, Genoa, Ill.

978,951. Party Line Telephone, to C. A. Soans and A. H. Graves, Chicago, Ill.

978,958. Telephone Desk Set Apparatus and Circuit, to B. W. Sweet, Cleveland, Ohio.

978,999. Relay, to H. Gernsback, New York, N. Y.

979,012. Telephone Repeater, to C. D. Lindridge, Providence, R. I.

979,145. Electrical Signaling, to R. A. Fessenden, Brant Rock, Mass.

979,154 and 979,155. Combined Primary and

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Secondary Battery System, to J. H. Gugler, Milwaukee, Wis.

979,277. High-frequency Electrical Oscillation Generator, to L. De Forest, New York, N. Y.

979,292. Telephone Cut-out, to P. H. Harner, Dooms, Va.

ISSUED DECEMBER 26, 1910.

979,467. Telephone Mouthpiece, to G. W. Gibbard and O. A. Elias, London, England.

979,569 and 979,570. Telephone Call Recorder, to H. K. Sandell, Chicago, Ill.

979,590. Telephone System, to S. S. Stolp, Chicago, Ill.

979,616. Telephone Switchboard Key, to K. Weman, Buffalo, N. Y.

979,986. Telephone Relay or Repeater, to H. Morgan, Quinter, Kan.

980,024. Telephone Receiver, to W. H. Thompson, Wheeling, W. Va., and H. R. Stuart, Milwaukee, Wis.

980,042. Telephone Transmitter, to C. Adams-Randall, New York, N. Y.

980,118. Telegraph Apparatus, to J. B. Odell, Chicago, Ill.

Multiplex Telephony and Telegraphy.

On January 3 four patents were issued to Major George O. Squier, United States Army, on a system of multiplex telephony and telegraphy, and his invention has been dedicated to the public.

The objects of the invention are to permit of simultaneous transmission of a plurality of telephonic and telegraphic messages over a single telephonic circuit; to eliminate cross-talk or other harmful effects; to impress electric waves or oscillations of such different frequencies upon the circuit as to make possible the selection and complete independence of the various messages; to superimpose upon a standard battery telephone circuit, as now commercially used, one or more additional telephonic and telegraphic circuits without any interference of the various messages, and to make use of grounded connections in combination with the usual metallic circuit.

Personal.

Mr. W. T. Gentry, president of the Southern Bell Telephone Company, Atlanta, Ga., was a recent New York visitor, coming here on business connected with the telephone and telegraph service.

Mr. Bion J. Arnold, the well-known electrical engineer, of Chicago, and a former telegrapher, has been elected a director of the Chicago Association of Commerce. Mr. Arnold is a past-president of the American Institute of Electrical Engineers.

Mr. E. F. Slack, manager of the new Canadian Press, Limited, Montreal, Que., was a recent New York visitor, coming here on business connected with the press service of Canada.

Mr. P. V. De Graw, fourth assistant postmaster-general and a well-known old time telegrapher, recently submitted to the postmaster-general his report for the year ended June 30, 1910. It is a comprehensive document and strongly recommends pensioning superannuated employes in the postal service.

Mr. J. M. Scott, formerly an operator on the Cincinnati, Hamilton and Dayton Railroad, and latterly trainmaster of the Kansas City Southern Railway at Heavener, Okla., has been appointed chief inspector for the Railroad Commission of Indiana.

Mr. J. Schanher, formerly manager of the Western Union Telegraph Company at Mount Clemens, Mich., accompanied by Mrs. Schanher and his son, Frank S., were recent New York visitors, on their way to Bermuda, where they will spend a vacation of three weeks.

Canadian Notes.

Telegraph Tolls in Canada. — The Canadian Board of Railway Commissioners has extended the time within which the Canadian Pacific Railway Company, the Great North Western Telegraph Company, and the Canadian Northern Telegraph Company may be allowed to charge tolls as authorized by law, and has extended the time to the same date for approval of the Grand Trunk Pacific Telegraph Company's tolls.

Mr. H. P. Dwight, president of the Great North Western Telegraph Company, Toronto, Ont., celebrated his eighty-second birthday on December 23. He is well-preserved and his many friends wish him many returns of the day. Mr. Dwight's career has been a busy and useful one, and his interest in human progress remains undiminished.

The Brown Magnetic Bridge.

Referring to the article in the issue of December 16 on the Brown Magnetic Bridge, Mr. Donald Murray, of London, writes: "There was a slight omission on my part which it may perhaps be well to rectify. In the diagram of the bridge I should have made it clear that there is only one inductance with two coils on it. I sketched it in the old bridge way, and it is right enough as long as it is understood that the iron in the two arms of the bridge is really one piece forming one magnetic circuit. If there were two separate masses of iron the currents in the two windings would not neutralize each other's magnetic effect, and there would be heavy inductive opposition to the outgoing current, which would of course be very injurious."

Christmas Night-Letter Rush.—The Western Union and Postal Telegraph-Cable offices all over the country were almost swamped with night-letter Christmas greetings. Telegrams from California to the East spoke of "picking roses on the lawn," while those from the East to the West told of the cold and snow.

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Recent Promotions in the Postal Telegraph-Cable Company's Service.

Mr. John F. Looney who was recently appointed superintendent of the Eighth District of this company, with headquarters at Chicago, is a native of the Hoosier State, having been born in Indianapolis, Ind., April 25, 1875. In 1887 he started his business career as messenger for the Western Union Telegraph Company in Indianapolis, and in October, 1890, he entered the Postal Company's service as branch office manager, and later was made cashier and bookkeeper, afterwards filling the positions of operator, night chief operator and day chief operator. On January 1, 1904, he went to Chicago to assume the position of assistant electrician and was afterwards promoted to be division electrical engineer. The district of which Mr. Looney will have charge is a newly created one and comprises the lines and offices in Wisconsin, Northern Michigan, Iowa, South Dakota and Minnesota, and that gentleman's wide experience will serve him well in his new position.

Mr. Charles H. Ashburn, whose promotion to the superintendency of the first district, Southern Division was announced in the December 1 issue, was born in Windsor, Va., February 8, 1866, and began his telegraphic career at Norfolk, Va., in November, 1883. He was operator for the Southern Telegraph Company in Norfolk from 1883 to August, 1886, and auditor for the Virginia Beach Railway Company from November, 1886, to August, 1887. He returned to the service of the Southern Telegraph Company in October, 1887, and in 1888 he entered the employ of the Western Union Telegraph Company at Norfolk, remaining with that company until August, 1889, when he became manager of the Postal Telegraph-Cable Company's office in that city. This latter position he held at the time of his recent promotion. Mr. Ashburn's headquarters will be in Richmond temporarily, but will later be removed to Atlanta, Ga.

Mr. Ed. R. Bennett, superintendent of construction and equipment of the Postal Telegraph-Cable Company of Texas, with headquarters at Dallas, Tex., was born at Del Rio, Tex., January 22, 1877. He first entered the telegraph service in November, 1891, at Fort Worth, Tex., serving as a messenger for a couple of years. He was afterwards engaged in other business, and on his removal to Dallas he entered the service of the Standard Light and Power Company. Later he went to El Paso for the electric light company in that place, and afterwards to Rincon, New Mexico. He assisted in the work of building the line of the Atchison, Topeka and Santa Fe Railroad and the Western Union Telegraph Company to Santa Rita mines. He returned to Dallas and went to work for the Postal Telegraph-Cable Company in December, 1900, holding a position as lineman and electrician until his present appointment.

Mr. William C. Daviet, whose appointment as superintendent of the fourth district, Southern Division, was announced in the December 1 issue, was born in Phillipsburg, N. J., December 24, 1875. He entered the telegraph service as a clerk in the bookkeeping department of the Western Union Telegraph Company in New York about 1895. On November 15, 1899, he accepted a position with the Postal Telegraph-Cable Company, in the message department and chief clerk in the New York City Bookkeeping Department, and since 1902 has filled the position of chief clerk to the superintendent of the second district, Eastern Division, New York, and to General Superintendent G. H. Usher, of the Southern Division, at Atlanta, Ga. He occupied the latter position at the time of his recent appointment.

Mr. Howard Almon Lanier recently promoted to the managership of the Norfolk, Va., office of this company was born at Petersburg, Va., August 27, 1876, and entered the telegraph service as messenger for the Postal Telegraph-Cable Company in Norfolk, March 23, 1890. He has never severed his allegiance to that company and has been in its service for over twenty years. From messenger he advanced through the various positions in the office until he finally became chief operator. During the past year he has filled the position of supervisor of traffic, and in the performance of his duties as such he covered many states in the north, west, and Northwest. His appointment as manager of the Norfolk office is a well-merited promotion.

Mr. Albert L. Lafferty, who has been promoted to be superintendent of the fourth district, Western Division, to succeed Mr. H. J. Kinnucan, with headquarters at Chicago, is a native of Detroit, Mich., and has worked his way up from the bottom. He entered the service of the Western Union Telegraph Company, February 1, 1881, when he was a boy. His service with the Postal Telegraph-Cable Company dates from May 1, 1887, and for twelve years he was manager of the Chamber of Commerce office of this company in Detroit. Nine years ago he was made manager of the Toledo office, which position he held at the time of his recent appointment as superintendent.

Mr. Jackson H. Dorsey, manager of the Postal Telegraph-Cable Company, Los Angeles, Cal., was born in Litchfield, Mich., November 22, 1870. He entered the telegraph service in Albion, Mich., June 28, 1887, and worked as operator for the Michigan Central Railroad from that time until 1891, when he went with the Western Union Telegraph Company, being manager at different points in Michigan and Indiana until 1897. From 1898 to 1901 he was operator in Chicago for the Western Union and Postal Telegraph-Cable Companies. He has been employed in the Los Angeles Postal office since 1901, where he filled the positions of operator, assistant chief operator, chief

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operator, and night chief operator, becoming manager early in December, 1910.

Mr. Edward F. Fahrendorf, who has been appointed assistant to the manager of the Cleveland, Ohio, office, was born in Covington, Ky., October 12, 1882. He entered the telegraph service as messenger in Cincinnati, Ohio, in 1896, and advanced through various positions, finally becoming cashier, which position he held at the time of his appointment to the Cleveland office. Between 1899 and 1903 he was engaged in other business.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. S. H. Mudge, superintendent of the third district, St. Louis, Mo., has been advanced to the position of division superintendent with headquarters at Chicago, vice F. W. Conger assigned to special duties.

Mr. John F. Looney succeeds Mr. Mudge as superintendent of the third district with headquarters at Chicago.

Mr. C. A. Comstock, manager of the Milwaukee office, has been promoted to be superintendent of the eighth district with headquarters at Chicago.

Mr. H. C. Shaw, division electrical engineer, Chicago, and Mr. Jesse Hargrave, division superintendent at Atlanta, were recent New York visitors coming here for a conference in the interest of the service.

Mr. F. H. Dernell, manager of the Rutland, Vt., office, has been promoted to the management of the Burlington office, vice F. F. Bradish, resigned, to enter other business.

Mr. E. D. Stone has been appointed manager of the complaint department. Mr. Stone has had considerable experience in this branch of the service and is well qualified to discharge the duties of his new office.

Mr. G. C. Clapp, of Boston, Mass., succeds Mr. Dernell at Rutland, Vt.

Mr. W. C. Lloyd, manager of the New Orleans, La., office, on Christmas day submitted to a surgical operation for the purpose of removing some of the skin from his body to graft upon the side of his young son who had received serious burns. Eighteen square inches of skin were removed from Mr. Lloyd's thigh. At last accounts the boy had good chances of recovery.

Mr. Philip L. Lee has been appointed manager of the Milwaukee, Wis., office of this company to succeed Mr. C. A. Comstock promoted to be superintendent. Mr. Lee is a native of Milwaukee, and entered the telegraph service ten years ago.

Mr. D. McNicol, of the electrical engineer's office, New York, has just returned from Chicago where he has been for the past two weeks on company business.

Mr. Augustus J. Eaves, of the Postal Telegraph-Cable Company's Pittsburg office, has been appointed to a position in the office of the electrical engineer at New York. Mr. Eaves was born in Bamberg, S. C., July 27, 1881, and began his telegraphic career on the Southern Railway in 1900. He entered the Postal Company's service in Pittsburg where he has filled the positions of repeater chief, wire chief and night chief operator. He occupied the latter position when he was called to New York to take up more important duties in the engineer's department.

Annual Meeting of North American Telegraph Company.—At the annual meeting of the North American Telegraph Company held in Minneapolis, Minn., January 3, the present officers were reelected, as follows: President, H. A. Tuttle, Vice-President, A. S. Harris; Secretary, D. G. McIntosh; Treasurer, E. C. Cooke.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager of the company, is making an inspection trip of the southern States east of the Mississippi river and will be absent until January 20. He will visit Cincinnati, Louisville, Nashville, Memphis, Birmingham, Atlanta, Montgomery, New Orleans and other commercial centers. He is accompanied by his secretary, Mr. W. C. Merley, and Mr. S. B. Haig, of the office of traffic engineer.

Mr. Wm. J. Lloyd, division traffic superintendent, of the Western Union, Chicago, was a recent New York visitor, coming here on business connected with the service.

Mr. H. J. Kinnucan, formerly superintendent of the Postal Telegraph-Cable Company, at Detroit, Mich., and who recently accepted the position of division general agent of this company with headquarters in the same city, has been appointed district commercial superintendent succeeding Mr. John Fitzpatrick, of Cleveland, Ohio. The district headquarters will be removed from Cleveland to Detroit. A picture and sketch of Mr. Kinnucan appeared in the January 1 issue.

Mr. John Fitzpatrick, district commercial superintendent of this company at Cleveland, Ohio, has been transferred to Chicago where he becomes superintendent of what will be known as the Chicago District, Western Division, which will comprise the main and branch offices in Chicago and such others in the immediate vicinity as may be added later.

Mr. J. P. Edwards, of the office of engineer of equipment, New York, has been appointed special agent of the southern division with headquarters at Atlanta, Ga.

Mr. F. J. Scherrer, accompanied by his wife and daughter, spent the holidays at their former home in Chicago.

Mr. A. E. Campbell has been appointed manager of the Detroit, Mich., office, vice Mr. C. H. Cadwallader, resigned. Mr. Campbell was chief clerk to Mr. H. J. Kinnucan when the latter was superintendent of the Postal Telegraph-Cable Company.

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Mr. S. V. King, manager of the Charleston, W. Va., office of this company, has been appointed district commercial manager of the territory embracing West Virginia and a part of western Maryland.

Mr. V. L. Brooks, chief operator of the Charleston, W. Va., office, has been appointed manager to succeed Mr. S. V. King, promoted.

The managers of the larger offices in the third district of the Eastern Division were present at a conference in the office of Mr. N. E. Church, district commercial superintendent, Pittsburg, Pa., on December 31. The managers present were S. V. King, Charleston, W. Va.; Harry Young, Wheeling, W. Va.; U. W. Boggess, Clarkesburg, W. Va.; W. T. McWhorter, Fairmont, W. Va.; H. F. Smith, Martinsburg, W. Va.; M. N. Haller, Elkins, W Va.; I. N. Sharpnack, Parkersburg, W. Va.; C. O. Pennypacker, Huntington, W. Va.; C. H. Reed, Bluefield, W. Va.; J. L. Snyder, Cumberland, Md.; J. C. McGraw, Jamestown, N. Y.; A. A. Jeunet, Franklin, Pa.; J. F Calahan, New Castle, Pa.; G. F. Stadtmiller, Erie, Pa.; E. E. Buel, Bradford, Pa.; S. W. Kirk, Johnstown, Pa.; E. Ross Collins, Pittsburg, Pa., and George S. Walters, district commercial manager.

Mr. Fay E. Horton, district plant superintendent, Salt Lake City, Utah, was born in Northville, Mich., October 11, 1872, and entered the telegraph service in Omaha, Neb., in 1885. Mr. Horton's activities have been in telegraph line construction and was general foreman at the time of his recent promotion. He is a son of the late Charles B. Horton, who was superintendent of the Western Union Telegraph Company at Omaha, and a brother of Mr. C. B. Horton, district commercial superintendent at that point.

During the holidays this company used a special telegraph form. It was printed on white paper and had a colored holly border, with the words "Holiday Greetings" printed in Old English. The novelty met with public favor and approval.

Mr. Thomas F. Breslin, of the Associated Press, Fall River, Mass., has been appointed manager of these interests at the same place, vice Mr. Joseph A. Elms, promoted.

W. H. Jackson, a well-known telegrapher, manager of the leased wire department of this company, New York, died January 5 of acute gastritis, after a brief illness. Mr. Jackson was born at Wellington, Ontario, January 3, 1854, and was a prominent figure in telegraphic circles in New York, and had many times been honored by being elected president and director of the various fraternal associations. He was highly esteemed by a large circle of friends and acquaintances. The funeral services were held Sunday evening, January 8, at the late residence of the deceased in Brooklyn. Ex-Senator Walter C. Burton conducted the ritualistic service of the Royal Arcanum and paid a glowing tribute to the character and memory of the deceased.

Mr. C. C. Delany has been appointed chief operator of the Jacksonville, Fla., office, vice R. L. Branton, resigned.

Mr. E. M. Edwards, assistant manager of the Western Union, Kansas City, Mo., office, has been appointed general agent for the second district of the Western Division, with headquarters at St. Louis.

Mr. W. F. Orr, manager of the Postal Telegraph-Cable Company, North Adams, Mass., has been appointed district commercial manager for Vermont and western Massachusetts for this company.

Morse Electric Club.—The annual meeting of the Morse Electric Club was held at 195 Broadway, New York, January 11, and the following officers were elected for the ensuing year: President, J. B. Van Every; vice-presidents, Belvidere Brooks and W. J. Dealy; secretary, Frank J. Scherrer; treasurer, R. J. Murphy. Directors for three years, Gardiner Irving and Marion H. Kerner. The club dinner will be held at the Savoy Hotel, February 23.

Plan to Get Rid of Loan Sharks.

The Western Union Telegraph Company has 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 of this is to get rid of the loan sharks who abound in all large centres, and whose importunities in many instances seriously impair the efficiency of employes. The effect of this policy will be beneficial in two ways. It will have a deterrent effect upon those who tend to borrow money on slight pretexts, and it will save the company legal annoyances, besides avoiding interference with business.

The company has thus set a precedent that should be followed by other great corporations, for there is nothing so detrimental to the welfare of employes than the operations of unprincipled loan sharks. By permitting workers to borrow reasonable sums without interest the company instantly will ease the sufferings and hardships of scores of persons who are kept in actual want by the loan sharks. In numerous instances employes who were hard pressed for money have been compelled to pay back to the shylocks as much as three and five times more than the original loan obtained. Such usury is not only demoralizing but it is dangerous. Many instances of the outrageous treatment of borrowers might be given. It has been found that every time a person is backward in making payments the hunt begins, and the loan shark never ceases hounding him until the employer, thoroughly annoyed, discharges the borrower. The new plan will undoubtedly have a wholesome effect, and is to be commended.

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A. C. Kaufman, Commercial Agent, Western Union Telegraph Company, New York.

Mr. Albert C. Kaufman, commercial agent of the Eastern Division, Western Union Telegraph Company, with headquarters in New York, was born in Clinton, Iowa. He took up the study of telegraphy while attending school in Canada and entered the telegraph service as manager of the Corn Exchange branch office of the Dominion Telegraph Company in Montreal. He was afterward in the employ of the Mutual Union Telegraph Company and later of the Canadian Pacific Railway Company. Later he went to Pittsfield, Mass., for the Commercial Union Telegraph Company, and when that company's

A. C. KAUFMAN
Commercial Agent Eastern Division, Western Union Telegraph Company, New York.

lines were leased to the Postal Telegraph-Cable Company in 1892, Mr. Kaufman remained as manager of the Pittsfield office. In May, 1899, he was appointed superintendent of the sixth district, Eastern Division, of the Postal Company with headquarters at Albany, N. Y. He retired from the Postal Company's service July 1, 1908, and engaged in telephone work in Canada. On May 15, 1910, he entered the service of the Western Union Telegraph Company as special agent to General Superintendent A. G. Saylor, and was, on December 1 advanced to his present position. Mr. Kaufman has a host of friends among telegraphers and business men, all of whom will wish him continued success.

Mr. John William Ware, district traffic chief, first district, Southern Division, with headquarters at Wilmington, N. C., was born in Locust Grove, Ga., November 16, 1882. In June, 1899, he entered the telegraph service at Adams Park, Ga., and has filled various positions, as follows: Manager at Bainbridge, Ga.; chief operator at Meridian, Miss.; traffic chief at Charlotte, N. C.; traffic chief at Jacksonville, Fla., and district commercial agent, third district, Southern Division, which latter position he held at the time of his recent promotion.

Mr. J. M. Green, manager of the Western Union Telegraph Company, at Sacramento, Cal., was born at Salem, Ohio, May 10, 1872, and entered the telegraph service at Nortonville, Kan., in September, 1891. He was agent for the Atchison, Topeka and Santa Fe Railway until February, 1905, and was traveling auditor for the same company during the year following. After that he was agent at Emporia, Kan., until September, 1910, when he entered the Western Union service.

Mr. Thomas E. Russell, recently appointed district traffic superintendent at New Haven, Conn., was born at Meriden, Conn., April 21, 1871, and entered the telegraph service in his native town as a messenger, in October, 1885. He became clerk, and afterwards passed through the positions of operator, manager, inspector, chief clerk to the superintendent, finally becoming assistant superintendent, which position he held at the time of his recent advancement.

The Telephone.

Mr. N. C. Kingsbury, Chicago, of the firm of N. W. Harris & Company, has been appointed a vice-president of the American Telephone and Telegraph Company with headquarters in New York.

Telephone Pioneers to Organize.

Signatures are being obtained with a view to the formation of an organization to embrace all persons of good standing employed in the Bell telephone service twenty-five years prior to January 1, 1911, and for five years continuously at any time thereafter. The suggested title for this organization is "The Telephone Pioneers of America." All the signers thus far entered the service prior to 1882. Applications for membership are solicited and may be forwarded to either Mr. Henry W. Pope or Mr. Chas. R. Truex, 15 Dey Street, New York.

Mr. P. L. Spalding has been appointed second vice-president of the Bell Telephone Company of Pennsylvania, the Chesapeake and Potomac Telephone Company, the Delaware and Atlantic Telegraph and Telephone Company and the Diamond State Telephone Company.

Telephone Reorganization in Cleveland.—The Cleveland Telephone Company, which is part of the system of the American Telephone and Telegraph Company, on January 1 changed the organization of its operating department to the "Three Column" basis, and the following appointments have been made in accordance therewith: Department commercial superintendent, Mr. T. P. Cagwin; department traffic superintendent, Mr. A. S. R. Smith, and department plant superintendent, Mr. E. E. Ranney.

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The Cable.

Cables Broken by Earthquake.—Four of the Eastern Telegraph Company's cables between Zanzibar and Durban, Africa, were broken on December 13 as a result of an earthquake.

Semi-Bridge Duplex for Cables.—Mr. Juzo Kajiura, a Japanese, was granted a United States patent on December 6, 1910, on a system of Electric Telegraphy, which he calls a "semi-bridge duplex." It relates to a duplex system to be used upon submarine cable and other telegraphic circuits containing or not containing overhead wires, one abject being to effect economy by reducing the number or capacity of the artificial cables required, as compared with ordinary "duplex" systems, while another object is to enable exact "duplex" balancing to be more easily and rapidly attained, and thereby to increase the working capacity of cable circuits.

Cable Receiver.—A London electrical journal of recent date prints a paper by Dr. A. C. Crehore and Major G. O. Squier describing a cable recorder in which variations of current are recorded by means of interference bands or fringes The coil in the recorder carries two small, thin plates of optical glass for producing interference bands. When the current is passed through the coil a torque is produced and transmitted through silk fibers to the upper glass plate, thus changing the pressure between the plates and altering the thickness of the thin film of air confined between them, and thus moving the system of interference bands. A commercial mercury-vapor lamp may be used. A current of .000002-ampere is a good working value for this recorder.

Quicker Telegraph Service with Spain.—In order to improve telegraph service with Spain, the telegraph officials at Barcelona have established a direct and well-equipped line to Bilbao, the Spanish terminus of the Direct-Spanish Company's Cable from England. Messages sent to the United States will be first telegraphed to Bilbao, thence to England by the Direct-Spanish Company cable, and then by transatlantic cables to America. Under this new arrangement messages will reach England a very few minutes after being dispatched in Barcelona and will avoid the necessity of transmitting messages across France to reach the Atlantic cables.

St. Vincent - Ascension Cable. — The cable steamer *Colonia*, of the Telegraph Construction and Maintenance Company, has laid the St. Vincent-Ascension cable for the Western Telegraph Company. The length of the cable is about 1,900 nautical miles.

New German Cable.—The new German cable from the West Coast of Africa to Pernambuco, Brazil, will be laid early this year.

New Atlantic Cable.—There is an evident revival of the old movement in England to lay a state-owned cable across the Atlantic between England and Montreal, where connection would be made with the Canadian Pacific Railway's telegraph system and the Pacific Cable Company's leased wires. The proposed route of the cable is from the north of Scotland by way of the Faroe Islands, Iceland, Greenland and Labrador.

The death of Mr. George Stevenson, in England recently, removes one of the few remaining links between the present and the early days of submarine telegraphy. Born in 1839, he joined the firm of Glass, Elliott & Company (afterwards the Telegraph Construction & Maintenance Company) in 1861, and on the laying of the first Malta-Alexandria cable was made clerk in charge of the Alexandria station in 1868. He remained as superintendent at Alexandria until 1885. After the Arabi rebellion and the hardships endured by the Eastern Company's staff at Alexandria, his health declined, and he was transferred to head office in that year. Here he worked for ten years under the late Mr. W. T. Ansell. In 1895 he retired on pension. His death in his seventy-second year will be regretted by a large circle of cable men all over the world, who will retain a warm feeling for their kind-hearted superintendent.

The Marconi Company's Business Campaign.—The Marconi Wireless Telegraph Company of America is engaged in an active campaign for business in New York. The service between Glace Bay, N. S., and Clifden, Ireland, is stated to be absolutely reliable and business is being flashed through the air between these points day and night without interruption. In America the land lines of the different wire companies are utilized to carry the business to the Glace Bay station, and on the other side the messages are transferred to the government land lines and thus distributed to their destinations. The company has recently established permanent stations at Philadelphia, Cape May, N. J., Virginia Beach, Va., The Breakers and Royal Poniciana at Palm Beach, Fla., for handling messages to and from steamships in the southern trade. Two new stations are being installed along the southern Atlantic coast, one at Cape Fear and the other at Fernandina, Fla. A station is also being established at Nassau, New Providence.

New French Telegraph and Telephone Journal.

"Annals of Posts, Telegraphs and Telephones," is the title of a new publication in Paris, France, under the authority of the Minister of Public Works, Posts and Telegraphs.

Among the articles in the first number is the address, in French, of Mr. J. J. Carty, chief engineer of the American Telephone and Telegraph Company, New York, delivered last September before the Paris meeting of the International Conference of Telegraph and Telephone Engineers, and others of interest to telephone people. The work is to be issued every three months.

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Status of Legislation for Relief of Military Telegraph Operators.

Bill No. 24211 in the House of Representatives, at Washington, which provides for extending the Pension Laws of the United States to the military telegraph operators who served in the civil war, is now being considered by a sub-committee of the House, with Captain John A. T. Hull, of Iowa, as chairman. Captain Hull has continually expressed sympathy for the beneficiaries to be and it is hoped that his sympathy will now take a practical turn and a favorable report be made. Congressman E. L. Taylor, Jr., of Ohio, fathers the bill and will use every effort to secure its passage. In addition to the "Appeal to Congress," the following petition has been filed with President Taft:

Holmesburg, Pa., December 12, 1910.

Hon. William H. Taft,
President of the United States.

Mr. President:—Having read with care your recent message to the Congress, we, in common with all Americans who love their country and its institutions, are deeply impressed with its fullness and clearness as well as its patriotic progressiveness and the wisdom of its recommendations.

There is in it, however, one minor suggestion that, through a misunderstanding of its scope, might promote the continuance of a national injustice to a small and fast disappearing body of men who served in the United States Army throughout the civil war. We thoroughly agree with you that the Congress should not "distribute the bounty of the government to classes of persons who may, at this late day, from a mere mercenary motive, seek to obtain some legal relation with an old veteran now tottering on the brink of the grave," but we do feel that it would be a great injustice to embrace in those classes, as doubtless will be done, the members of the United States Military Telegraph Corps of the United States Army who served 1861-1865. The Act of Congress, approved January 26, 1897, clearly recognized them as soldier-integers of the army, and as the armies of the world are now constituted, the militarv telegraphers are soldier-integers. It can hardly be claimed that a class of men who are soldiers in time of peace were any less soldiers in time of war.

The Military Telegraph Corps was a body of young Americans who brought to perfection that mystic arm of military service subsequently adopted by the nations, but who as yet have not had their services in doing so recognized by their own government. For thirty years their appeals have been before the Congress for justice and for the reparation of the wrongs they have suffered by not having their soldier status with all its rights and privileges proclaimed. It will thus be seen that they cannot in truth be classed with the tottering veterans as latter-day mercenary seekers for a legal relation.

The leading generals of the Civil War bore testimony that the military telegraphers were soldiers de facto, and all they ask or have asked is to have that status made de jure.

General U. S. Grant, in a letter written in 1884, said: "I will endeavor to show how indispensable the telegraph was to our success, and how uniformly well the service was performed by the operators in the field. The telegraph and the signal service, its co-ordinate, were as necessary to our success as the railroad is to commerce."

General William T. Sherman, in a letter written in 1882 said:

"They were as much a part of the army as though armed with muskets in the ranks," and he classified them with "staff soldiers and officers."

General W. S. Rosecrans in a telegram from the field in 1863 said in relation to them:

"Those at my headquarters do more work and have more responsibility than any captain in the service."

The veterans at the national encampment of the Grand Army of the Republic at their Milwaukee meeting passed resolutions recognizing the corps as constituting "in fact a part of the Union Army partaking of its hardships and dangers while rendering invaluable aid," and petitioned Congress to recognize the status and services of the corps by appropriate legislation.

Such testimony as the foregoing can be multiplied indefinitely, but we refrain from further quotation and append hereto several documents containing fuller testimony to the soldier-status of the members of our corps. There are but about two hundred survivors out of a possible fifteen hundred, their average age approximately, is seventy years, and in their fast declining years they appeal in all confidence to the high sense of justice possessed by the President of the United States for the influence that will obtain for them the rights of which they have been so long deprived.

Most respectfully,

WILLIAM BENDER WILSON,
PRESIDENT, HOLMESBURG, PA.

DAVID HOMER BATES,
SECRETARY, 658 BROADWAY, NEW YORK.

Wireless Telephony From Moving Trains.

The Railophone, an invention of Mr. Hans von Kramer, designed to telephone to and from moving trains, is thus described: The principle applied is that of induction, emanating from large wire frames of special construction, which are suspended from the bottom of a railway coach near the track. From the frames the terminals of which are connected to telephone instruments placed in a sound-proof box on the train, electrical impulses are induced in a stationary wire fixed between the track-rails on which the train travels, one wire being laid on the 'up,' and a similar wire being laid on the 'down' track. The ends of these two stationary wires are connected either to the telephone apparatus at the railway terminus or to an intermediate station between the termini. The messages received from the train are telephoned or telegraphed by the railway company to their destination, or, vice versa, communicated to the passengers on the train.

To Manufacture Cables in Australia.—From Melbourne, Australia, comes the information that a company intends starting the manufacture in Australia of cables, wire, and other material used by the Telegraph Department.

Wireless in South Africa.—The Union Government has decided to erect a wireless telegraph station at Slangkop, near Kommetje. A contract has been entered into with the Marconi Company, and it is expected that the station will be in working order in a few months. It will be a 5-KW. station and will have a day range of 400 miles, while at night the range will be from 600 to 1,600 miles.

Wireless in Siberia.—A system of wireless telegraphy has been established between Nikolaiefsk and Petropavlovsk in Kamschatka.

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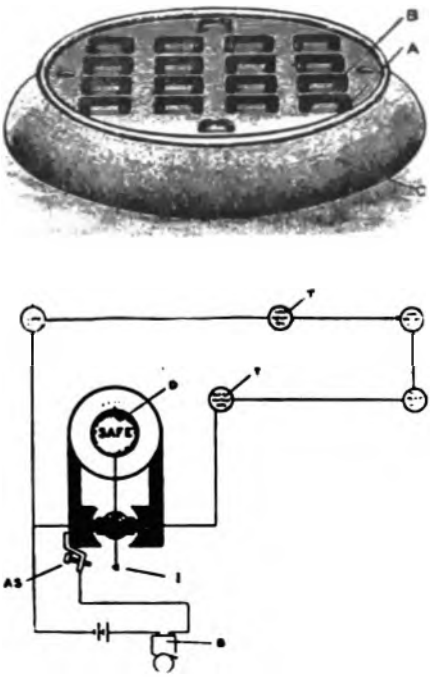
New Automatic Fire-Alarm System.

A new automatic fire alarm system has been invented by Mr. L. T. Reichel, former chief electrician to the New Zealand Government Public Works Department.

The following description of the system and the illustrations are taken from the London Electrical Review:

One of the novelties in the system lies in the fact that it is entirely unaffected by dust and vibration, for there are no line contacts involved, neither are there any batteries having what may be termed primary functions in the system. Upon the care spent upon the maintenance of batteries entirely depends the success of many fire-alarm schemes—a detail involving a personal element often found wanting when an emergency does arise.



FIGS. 1 AND 2. AUTOMATIC FIRE ALARM SYSTEM.

The Reichel system depends upon the use of thermopiles made up of couples of bismuth and an antimony alloy. Such couples—any number of which may be chosen according to the degree of sensitivity required—are mounted in a porcelain block *C* in such a way that one series of junctions *A B* only is exposed to the air (Fig. 1). The blocks, with their couples protected from accidental mechanical injury by a suitable grid, are mounted on the ceilings of the apartments which it is desired to protect. A detector of this type possesses a useful feature in that a room may be gradually heated to any degree of temperature that comfort or utility demands without affecting the alarm device, due to the fact that the length of each couple is so short that the temperature lag of the unexposed junction follows closely behind the exposed junction, so that, at an ordinary rate of temperature increase, little or no thermo-e.m.f. is generated; whereas, if a sudden rise of temperature occurs in a room where the pile is installed, such as would arise from even a small conflagration, a thermo-e.m.f. will instantly be generated to operate the alarm. This feature might have somewhat of the nature of a drawback where it is desired to protect apartments from the effects of a smouldering fire, but this difficulty is surmounted in the Reichel system by an auxiliary device which causes the warning to be given should the temperature at any time reach a predetermined figure.

Groups of from one to ten such thermopiles are connected by insulated wires in one series circuit, and each of the circuits is connected to an indicator mounted in a suitable case with others for different circuits.

The indicator (Fig. 2), consists of a sensitive moving-coil relay whose tongue carries a light iron disk upon which the platinum contact point is mounted. In juxtaposition thereto is an adjustable iron screw *A S* which carries the fixed contact, and which is magnetized. These contacts form part of a local circuit, including a suitable battery and such warning bells *B* as are necessary. A deflection of the coil from its normal position moves the iron disk into the range of magnetic pull of the screw, when the former is pulled over and the contacts held firmly together until the coil is restored by hand. The adjustable screw forms a ready means of fine adjustment of the range of operation of the warning, already approximately determined by the selection of the number of couples in the detectors *T*. The moving coil also carries an arm to which is attached a disk *D*, which, according to its position, displays the words "safe" or "fire" through a window in the indicator case.

The indicators, &c., are mounted upon a central board, from which the various thermostat and warning bell circuits radiate in the usual way, and the board is fitted with various control switches, means for testing the condition of the local battery, and an ingenious method for testing the continuity of the alarm circuits by the insertion of the test detector, which, when breathed upon, causes the appropriate indicator to deflect should its circuit be continuous.

The efficacy of the system was demonstrated by the fact that, in a room whose temperature may vary as widely as from 150° F. in the day-time to somewhere about 40° F. at night without causing false alarms of fire, it was sufficient merely to place one's hand upon one of the thermostats for a very brief period for the alarm to be set going.

New Maine Corporation.—The Public Service Company has been organized in Portland, Me., with a capital of $800,000, for the purpose of constructing, owning and operating railway, telephone and telegraph lines, etc. The officers are: President, George F. Duncan of Portland; treasurer, Edward Woodman of Portland.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher,
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

January 16, 1911.

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

Importance of Efficiency.

A plant superintendent of the Western Union Telegraph Company in a communication to the editor of this journal in answer to a request for a biographical sketch of himself for publication writes: "I have never known the time when efficiency meant so much to the corporation and to the individual employes as it does now. It is a word that looms up large in the want department of every company, therefore, I am sure that you will not consider me lacking in appreciation, or presumptuous in suggesting that your space can be used much more profitably along educational lines rather than employing it for a personal reference to the writer.

"The rank and file of this company is not as efficient as it should be, and what is more important both from the standpoint of the company and that of the employes, it is not as efficient as it would like to be, and I am sure that your co-operation is not only desired, but, judging from the past, is assured for the future."

Our correspondent may rest assured that Telegraph and Telephone Age stands for progress in telegraphic affairs. The telegraph business in the United States is now undergoing a change, the like of which has never been known, and in order to carry out the plans of the companies the efficiency of plant and management must necessarily be increased. The word efficiency means to get the most out of a given expenditure or consumption of material. The material may be brains, coal or any other substance from which energy is obtained.

It is a well known fact that there is ordinarily much waste of effort and material in producing results, and we get much less in return for our work or investment than we should receive. The question is "How can efficiency be increased," or, in other words how can waste be prevented? If we accomplish more for the same expenditure of effort or energy, we are increasing efficiency.

It has been the aim of this journal in the past to point out to its readers how to improve themselves, *i. e.*, increase their individual efficiency. The way to do this is essentially an educational task. The more a man knows the greater is his capability and if his knowledge is rightly applied good results will surely follow not only to himself but to others. Concentration of thought and effort, or in other words undivided attention to the subject in hand, is the secret of efficiency. Careful reading and study of wholesome literature and of the technical articles which appear in the columns of this and other standard journals is essential to mental improvement, and having the right mental equipment to work with there should be no fear for the results.

The telegraph companies are eager for men with technical and business knowledge and every man in the service should set about qualifying himself for a better position. Education is the only solution of the problems referred to by our correspondent. It does not necessarily follow that a man should have a college education. True education is obtained rather from the appropriation of every little useful fact, however or wherever obtained, and placing it in our mental storehouse for future use. This means also that we should learn something each day that we did not know before, and to that end it is the purpose of this paper to aid and encourage those of its readers who really desire to qualify for better positions.

Lifting Up the Messenger.

In the general awakening in telegraphic circles the messenger is not forgotten. Many have come to realize that he is an important factor in the business and is deserving of better treatment than being made the subject of so-called newspaper jokes; in fact, he is a human being and as such is entitled to consideration by other human beings.

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In a recent article on the subject of messengers, Mr. Charles P. Bruch, third vice-president of the Postal Telegraph-Cable Company, New York, writes: "Let those of us to whom these boys are now subordinate take care that we set them good examples in uprightness and square dealing, diligence in business and faithfulness to duty in all the relations of life, so that when they, too, are men they may be good men."

The Western Union Telegraph Company is giving attention to the interests of its messengers as it is doing for its higher grade employes, and no one will question the wisdom of such a course. Generally speaking, the messengers of today are the operators of tomorrow, and many of them the officials of the future, and for this reason alone the telegraph companies might, with propriety, exercise, in an organized manner, educational and parental influence over the youthful mind as far as it can consistently do so, and thus raise the standard of efficiency of its future employes.

At a recent meeting in Denver of officials of the Western Union Telegraph Company the messenger boy problem was considered. District Commercial Superintendent U. G. Life, of Salt Lake City, held that the messenger boy is the beginning and end of the telegraph service—he carries the message to the office for transmission and carries the transmitted message to the addressee at the other end. "To really improve and increase the company's efficiency," said Mr. Life, "the reliability and responsibility of the messenger boy must be considered of paramount importance." He advocated the establishment of reading-rooms well supplied with wholesome current literature for the benefit of the boys, and the employment of a capable instructor to teach them how to telegraph and to give instruction in other lines of the telegraph business, with the object of awakening a desire and an ambition to rise to positions of importance. He would also forbid smoking, especially of cigarettes, and drinking, and place moral safeguards around the lives of the boys.

This is a very commendable suggestion and should receive the hearty encouragement and support of the company. Mr. Life proposes to carry out these policies at his headquarters in Salt Lake City, and the results will certainly be watched with wide-spread interest. His solicitude for his boys was manifested by giving them a Christmas dinner, followed by a plain common sense talk on how they could best serve themselves and the company.

This instance of entertaining messenger boys, however, was not the only one in the country at that time. At other places they received consideration and attention, and in each case a deep impression was created upon their minds. In Baltimore, seventy-five boys were entertained by Dr. and Mrs. H. B. Jacobs with a Christmas dinner, followed by a minstrel show, and in other places public-spirited citizens gave the youngsters a Christmas treat.

The telegraph companies can well afford to be mindful of their boys' welfare when they have public sentiment with them, as they certainly have.

New York Public Service Commissions.

A bill has been 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. It is to be composed of five members, one for each borough, to be elected by the people. The other commission, for the territory outside of New York City, is to be composed of members appointed by the Governor. The salary of each commissioner is placed at $10,000 instead of $15,000, the annual salary of the present Public Service commissioners. Jurisdiction over telephone and telegraph companies is divided between the two commissions.

The Death of B. F. Dillon.

In the recent sudden death of Mr. B. F. Dillon, general superintendent of the Western Union Telegraph Company, at Atlanta, Ga., which was noted in the issue of December 1, the company has lost one of its most capable and popular officials. His death has given rise to widespread expressions of regret, emphasizing the fact that he was held in the highest esteem by all who knew him. As further evidence of this, we have received letters from various sources testifying to the lovable character of the deceased and paying affectionate tribute to his memory. These expressions were of the sincerest kind, and some of the writers declare that they feel the loss as much as they would of their father or brother.

His warm and sympathetic heart and kindly disposition, as well as his dignified bearing, endeared him to many, and while he is gone in the flesh, he will live long in mind. The world would be a much happier and brighter place of existence were there more such spirits in it as was his.

Holiday Greetings.

We have received Holiday cards and greetings from Mr. Harry A. Tuttle, general manager of the North American Telegraph Company, at Minneapolis, Minn.; Mr. W. F. Williams, superintendent of telegraph, Seaboard Air Line, Portsmouth, Va.; Mr. William Murphy of Manzanillo, Cuba; Mr. W. H. Potter, superintendent of telegraph of the Southern Railway System, Washington, D. C.; Mr. Frederick W. Cushing, the well-known old-time telegrapher and now proprietor of "The Moraine," at Highland Park, Ill.; Mr. J. Hartman Oswald of Memphis, Tenn.; The Commercial Cable Company, New York; Mr. Clarence R. George, secretary International Association of Municipal Electricians, Houston, Tex.; Mr. E. J. Nally, vice-president and general manager, Postal Telegraph-Cable Company, New York; Mr. W. H. Baker, vice-president American District Telegraph Company of New Jersey, New York; Sanosuke Inada, engineers' section, Department of Communication, Tokyo, Japan; Mr. T. Waldemar Goulding, European General Manager Western Union Telegraph Company, London, and others.

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Trying to Get Something for Nothing.

Compensation is a natural law, and exacts an equivalent in one form or another for everything we give or receive. But this is a hard lesson for many people to learn. The idea of getting something for nothing has possession of many minds, and after more or less unsuccessful experience they finally come to the conclusion that they can not acquire anything of value without rendering an equivalent. Take for instance the mania for investing in "wild-cat" financial schemes of all sorts. Very few of such enterprises so-called yield any returns to the original investor not on the inside. Indeed, he usually loses all he puts in; the odds are largely against him. The greatest difficulty in the situation is that would-be investors are influenced by the glittering language of prospectuses and circulars sent out by the questionable concerns, frequently in the face of common sense advice given by friends who understand the character of these schemes. Some investors know better, but they will take chances in spite of their better judgment.

Those who invest in these questionable enterprises are those who usually can least afford to lose their money. The promoters of these schemes understand human nature well. They take advantage of the cupidity and gullibility of the average man and they depend upon those human weaknesses for their success. It can be safely accepted as a truth that any legitimate enterprise can get all the money it needs for promotion through legitimate channels, instead of seeking its capital form the "dear public" in small amounts. To those who have some spare money they desire to invest our advice is do not put it in any questionable scheme, however, promising the promoters make it out to be. Better deposit the money in a reliable savings bank where three or four per cent interest is paid, and the capital can be had any time in case of necessity.

Along this line there is another class of persons who seem willing to part with their earnings on the slightest pretext. We refer to those who are addicted to the horse-race betting evil. This habit soon makes a slave of a man and it is difficult to shake off the incubus. Many men have this disease, if it may be so called, and they are surely drifting to ruin if they do not wake up to a realization of their peril. "Ill-luck" constantly pursues them; at least, they call it ill-luck. In fact, it is not ill-luck at all; it is their own ignorance or their unwillingness to follow the dictates of their better judgment, and for this the penalty is what they call ill-luck. It is the natural result of trying to get something for nothing.

So extensive and morally damaging has the business of promoting and conduct of dishonest projects become that the United States government has taken cognizance of the seriousness of the situation and is endeavoring to protect innocent investors by depriving the promoters the use of the mails in carrying on their illicit business. But the individual should protect himself and not depend upon the government to improve his morals for him. A bad man cannot be made a good man by law; but he can be made good by education.

Many men in subordinate positions stand in their own light, yet they do not realize it. They usually think that the fellow that gets ahead does so by means of a pull or other subtle influence, whereas, if the truth were known, the advancement is in most cases found to be due to merit attention to duty and faithfulness. The man who plays the races, and shows too much interest in prize fights and sporting matters in general, to the exclusion of other more serious affairs of life, cannot make any progress, because his mental activities lack breadth as a result of his devoting too much time to frivolities. He has become a mere machine and is not capable mentally to undertake any duty which requires serious thought. There are, unfortunately, too many of this class and it is sincerely to be hoped that with the New Year they will shake off their shackles and free themselves from all degrading influences. Every business needs good, faithful and reliable men.

Bound Volumes of Telegraph and Telephone Age.

For those of our readers who desire to have the past year's issue of Telegraph and Telephone Age in a form in which they can readily preserve all of the copies for future reference we would recommend a bound volume. We are now able to supply these containing the twenty-four issues of 1910 for the nominal price of $3.50. There are several features in one of these volumes which comprise nearly 900 pages of reading matter, which are alone worth much more than the amount asked. The series of articles by Willis H. Jones entitled "Some Points on Electricity" are in themselves worth the price of the book to any student. We have also published articles by the best informed authors upon the developments in wireless telegraphy, and, in fact, there will be found recorded in this book all of the important improvements in the wireless art during the past year. The use of the telephone for train despatching has largely increased since January, 1910, and we have kept pace with its development by presenting to our readers many articles upon this subject, written by some of the best posted men in the railway and telephone world. These are but a few of the many features presented in Telegraph and Telephone Age, during 1910, and those interested in any branch of the telegraphic industry will find much valuable information in one of these bound volumes. A copy of this work will be sent to any address upon receipt of price, $3.50, by J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Mr. Charles G. Burke, of 132 Nassau Street, New York, in renewing his subscription recently, takes occasion to say: "To anyone who is interested in telegraphy and kindred subjects, whether from a technical or commercial standpoint, Telegraph and Telephone Age is an indispensable necessity."

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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.]

(1) Q.—I have seen the word "Mho" used in electrical literature. Will you please explain its meaning?—R. A. B.

A.—The term "Mho" (which is the word "Ohm" spelled backward) is the proposed unit of conductance. It expresses the relative facility with which a given wire will conduct an electric current. It expresses the opposite of resistance, the unit for which is the ohm. The conductance of a wire is the reciprocal of the resistance of the wire. Thus if a wire has a resistance of 125 ohms, its conductance is the reciprocal of 125, which is 1/125.

(2) Q.—Is there any device of a practical character that gives an electromotive force of one volt exactly?—J. A.

A.—A cell of Daniell battery gives an E.M.F. of 1.07 volt, which is near enough to the standard volt for all practical purposes.

(3) Q.—How can I ascertain the amount of heat developed in a circuit by an electric current?—M.

A.—First ascertain the value of the current, then multiply the square of this value by the resistance of the circuit, and the product will represent the amount of heat developed, expressed in watts. Example: Assume that 2 amperes of current is flowing in a circuit of 80 ohms resistance, then, according to the rule given, $2^2 \times 80 = 320$.

(4) Q.—I understand that the current in a circuit has the same value at all points in the circuit. Is this true of the electromotive force as well? F. A. M.

A.—No. The electromotive force has a different value at different points in the circuit. The resistance of the wire reduces the E.M.F. Hence at one end it is higher than at the other. It is by reason of the fact that there is a difference of potential between the two ends that there is an electromotive force at all.

(5) Q.—What is meant by the polarization of a cell of battery, and what is the cause of it?—J. H.

A.—Polarization is an action within the cell which reduces the output of electricity. It is caused mainly by the accumulation of a film of hydrogen on the copper element (in the case of a copper-zinc cell). The gas, which is deposited in the form of bubbles, is a bad conductor, therefore it introduces a resistance to the passage of the current from the electrolyte to the copper. The effect of this foreign resistance is to reduce the current.

(6) Q.—Has thermo-electricity ever been developed to a point where it could be considered of commercial value. It is a simple method of producing electricity, but I have never heard of its being put to any practical use?—A. R.

A.—The greatest disadvantage of the thermo-electric couple is that it is of very low efficiency, only five per cent. of the energy of the fuel being actually utilized in producing the current. This fact alone is sufficient to condemn the thermo-electric battery for practical use.

American Telegraph Company in 1865.

The telegraph blanks of the American Telegraph Company of 1865 gave a list of branch offices in New York, on their reverse side, which in these times recalls some old landmarks. The locations of these offices were as follows:

Hudson River Railroad depot on Warren street; International Hotel, Broadway and Franklin; Earle's Hotel, Canal and Centre; St. Nicholas Hotel, Broadway and Spring; Westchester House, Broome and Bowery; Harlem Railroad depot, Twenty-sixth street and Fourth avenue; St. James Hotel, Broadway and Twenty-sixth street; New Haven Railroad depot, Fourth avenue and Twenty-seventh street; Allerton's, West, Eleventh avenue and Forty-first street. The blank suggested that messages be repeated to insure accuracy "on account of some of the errors arising from atmospheric and other causes appertaining to telegraphy." The main office was at 145 Broadway.

The officers of the company included E. S. Sanford, president; Cambridge Livingston, secretary, and Marshal Lefferts, engineer.

Gold Excitement and the Telegraph in Australia.—The telegraph facilities at Southern Cross, Western Australia, are severely taxed in consequence of the business resulting from the discovery of a rich gold reef near that place. Extra instruments and men are employed night and day to cope with the large volume of business.

New York Electrical Society.—At the meeting of the New York Electrical Society on December 14, an amendment to the constitution was passed creating a life membership in the Society. Twenty-five life members were elected, among them being Messrs. Frank J. Sprague, H. Ward Leonard, T. C. Martin, Kingsley G. Martin, C. A. Coffin, John J. Carty, Charles Blizard, Thomas A. Edison.

Telegraphy in Australia.—The Postal Commission which has been inquiring into the working of the Australian post and telegraph system has issued its report. Many defects in the service are pointed out and improvements are suggested, including the expenditure of $10,000,000 for this purpose.

Wire Thefts in Russia.—The telephone companies in Russia experience much trouble through the theft of the copper wire of the lines. It is stated that the line between St. Petersburg and Moscow is rendered idle for hours several times a week from this cause.

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Patent Protection Is Costly.

The Chicago *Tribune* recently printed the following interesting article relating to the great expense involved in the protection of patents by electrical manufacturers:

"About ten years ago Mr. George Westinghouse caused a statement to be prepared showing the legal expenses of the protection of his patents from the time he began inventing and marketing electrical apparatus. He was amazed when he saw the total. He passed the paper containing the figures to the author, Mr. Holland, saying:

"'You will see how large an item of expense litigation for the protection of patents is for a manufacturing company like the electrical company of which I am president.'

"Mr. Westinghouse was asked if he thought the other great electrical corporation, of which Mr. Coffin is president, had been compelled to pay bills of equal, or approximately equal, amounts.

"'His bills must have been large,' Mr. Westinghouse responded.

"It was the contemplation of a sum which of itself would have been regarded as a large capitalization for a corporation, the total expenses of litigation to protect patents, which undoubtedly brought about an understanding between the larger of the electric companies of the United States.

"That agreement provided that each company might use the patents of the other, subject, of course, to a fair royalty. The agreement may be regarded as in restraint of trade, as tending to prevent competition. But that was not the purpose of it. It was entered into simply to put an end to heavy legal expenses.

"Mr. Thomas A. Edison had a similar experience. To protect his patents has cost him millions, and although in almost all cases he has received final judgments in his favor, yet many of these judgments were handed down only a few months before the expiration of the patents. In not one instance has Edison ever received a penny representing damages awarded by the courts for the infringement of his patents. This experience has led him to be strongly in favor of the license system, and he has sometimes wondered whether he would not have been better off pecuniarily had he relied upon the trade secret principle for the protection of his inventions.

"Word has come from Washington that the Department of Justice is about to begin proceedings in the federal courts, having for their purpose the dissolution of the so-called electric trust. It will be something of a surprise if the evidence obtained by the government makes it clear that the great electrical companies of the United States are practically operated upon the combination or trust principle. Certainly the competition, at least until within a short time, between them, has been remarkably keen.

"There is still vivid recollection in commercial and railway circles of the fierce competition carried on by the two great electric companies for the contract of electrifying one of the greater railways of southern New Jersey.

"In this city, after the legislature commanded the railroad companies to abandon steam and electrify their terminals, a competition which was scientific as well as theoretic, and in addition practical and financial, was in progress.

"From the scientific point of view this competition involved demonstration of the economy, safety, and expediency of the direct current, which apparatus is controlled by President Coffin's company, and the alternating current, which utilizes inventions of Mr. Westinghouse and his associates. The New York Central Railroad accepted the propositions made by President Coffin. The New Haven railroad preferred the alternating current and the apparatus for using it. The struggle was a desperate one. In it is not to be found any evidence of such a combination as the attorney general might reasonably regard as having been forced in violation of the anti-trust law.

"So far as the public knows, the only combination entered into between the greater electric companies is one involving a common use of patents upon payment of royalties. Apparently the Department of Justice deems it worth while to test in the courts whether or not a monopoly secured by patent may be so used to justify the allegation that this is done in violation of the anti-trust law.

"Should the courts so find, then a new and unexpected issue will have been created. It might be so extended as to include some of the companies operated under the Edison patents. It would almost appear to invalidate the license system, certainly if the system gave exclusive right to one corporation within a certain district, to operate under patents controlled by another corporation. So far as now can be seen, the question involving proceedings against the so-called electric trust is simply this: Must a corporation that controls a patent be compelled to make exclusive use of that patent in its own manufactory? For it is thought to be apparent that the Department of Justice does not purpose attacking the monopoly itself, which is the vital quality of a patent."

Telephony in China.—Consul General Knabenshue at Tien-Tsin, China, reports that the use of the telephone in that country is increasing rapidly, and urges American manufacturers to enter the field for the future telephone trade of the empire. The telephone system is controlled by the Board of Communications. Members of that board express the belief that within a few years systems will be in operation in nearly every city in the country.

Any book on electrical subjects can be obtained through Telegraph and Telephone Age, 253 Broadway, New York.

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New Telephone Board in Nashville Western Union Office.

A new telephone switchboard has recently been installed in the office of the Western Union Telegraph Company, at Nashville, Tenn., for the purpose of exchanging business over the two services. It is a departure from the standard private branch exchange board generally installed and was designed to make its operation as simple as possible.

Instead of the usual signal lamps in front of each operator, there are ten eight-candle power lamps, located on top of the board, one for each trunk. An incoming signal causes a lamp to glow at full brilliancy. When the trunk is taken up, the lamp glows dimly. By locating the lamps above the desk in full view of the general office, the manager at his desk or any clerk in the office can see when calls are not being answered promptly and can go to the assistance of the operators at the board.

The board has six positions, three on each side of the desk. While both sides of the desk are built alike, it was intended that one side should be used for the "receiving" side and the other three positions for the "sending" side. In the key cabinet above the writing desk are twenty-six pigeon holes extending entirely through the cabinet so that the pigeon holes can be reached from either side of the desk. These pigeon holes are lettered alphabetically. When a telegram is delivered by any one of the operators, it is filed alphabetically, and in case of any operator later receiving an inquiry in regard to a delivered message, the operator can instantly locate the message, giving whatever information is desired. A feature of the trunk circuit is a switch controlled by a floor push depressed by the foot of the operator. This cuts out all of the apparatus in the circuit excepting the receiver which is then bridged across the line, at the same time cutting out side tones in the transmitter.

All of the operating positions are equipped with head receivers and breast transmitters excepting one position where the ordinary desk stand is used, this being intended for the use of employes of the several departments of the manager's office.

The manager's desk is also equipped with a set of keys corresponding with each trunk, and by depressing the corresponding key, he can listen on any trunk and observe the character of service given the subscriber.

During the night and on Sundays there is a buzzer associated with the calling lamps, giving an audible signal to any clerk on duty, it not being necessary during these periods to keep an operator at the board. The board was designed by E. M. Fisher, superintendent of traffic of the Cumberland Telephone and Telegraph Company. Mr. Fisher being a former telegrapher, realized the necessity and requirements of both services.

The Turin International Telegraph Tournament.

In our issue of July 1, 1910, we published some preliminary facts relating to the proposed international telegraph tournament in Turin, Italy, in 1911, in connection with the International Exposition of Labor and Manufactures.

This competition, which has for its aim the awakening of a new interest among all telegraph employes and to encourage them to perfect themselves in the use of the apparatus, is open to telegraphers in the service of the government administrations and the companies belonging to the International Telegraphic Union, as well as to the other administrations and private companies. The competition will consist of a trial of sending and receiving by Morse apparatus, Hughes or Baudot, either individually or between representatives of the Administrations or private companies who take part.

The trials will be judged according to special rules by a jury in which the visiting administrations will be equitably represented.

The jury will have at its disposal as a reward for the winners prizes of money, medals and objects of art. Letters of invitation to take part in this tournament have been sent to all of the administrations and private companies. This competition is being planned with the object of strengthening the feeling of friendship which already exists between telegraphers of different nations. M. Ferdinand Geronimi, Minister of Posts, Rome, Italy, is in charge of the plans for the affair.

The final announcement of arrangements will not be made until the decision as to the time for holding the tournament, and the Italian government will issue the programme just before the time set for the contest to begin.

Much interest is being manifested in the event by the Spanish and other foreign papers, and in a bulletin issued by the Italian Minister of Posts and Telegraphs, that official urges Italian operators to make a good showing. It is hoped that the United States will be ably represented at this tournament, and it is about time to take preliminary action in the matter.

In these days of rapid promotion in the telegraph and telephone service every aspiring operator should prepare himself for any opportunity in the way of promotion that may present itself by acquiring a technical knowledge of his profession, and a thorough understanding of telegraph apparatus. There is no better way to do this than to study Maver's "American Telegraphy and Encyclopedia of the Telegraph," as hundreds of men now prominent in telegraph affairs will attest from personal experience. It is the most up-to-date publication on the subject and is regarded as authority on all points covered by it. To facilitate the purchase of this work by operators and others, the publishers have announced a new departure in the sale of the book, the particulars of which will be found in our advertising columns in this issue.

Telegraph and Telephone Age is headquarters for all electrical books.

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Porcelain and Glass Insulators.*

BY ARTHUR BESSEY SMITH.

When people began to experiment with electricity they very soon discovered the value of insulating bodies to keep the mysterious fluid where they wanted it and make it perform the desired tricks. But when this force began to be applied to commercial uses involving its transmission over outdoor lines, the problem of insulation became really a live issue. In dry weather almost any kind of a support would do, but in wet or foggy times the best available insulation was found to be none too good.

Some of the early experimenters with telephones used glass bottle necks, each supported by a nail through the hole. But it was found that in wet weather the leakage was still very great. The cup-shaped insulator then came into use. It had the form of an inverted cup to secure between the wire and the support a space which is dry even during a rain. It was thus recognized that the leakage is chiefly across the surface, and not through the body of the insulating material. Just what this material shall be is determined largely by the cost and the results to be obtained.

In America, glass has predominated for telephone and telegraph lines, while in Europe, especially in England, porcelain and stone ware have been favored. Accordingly a short and, of necessity, incomplete study has been made of the conditions existing in these countries with a view to ascertaining the relative values of glass and porcelain for telephone use. Because the climate of England is exceedingly adverse to outdoor insulation, the conditions there have received chief attention.

MATERIALS FOR INSULATORS.

In England glass telephone and telegraph insulators are almost unknown. Ninety-five per cent. of the insulators now in use are porcelain, while the rest are of stone ware. The best porcelain insulators cost from ten to twelve cents each in lots of 10,000, while a glass insulator costs less than 3 cents.

Cast glass was formerly used very largely, but very few are left, as they showed too low insulation and broke in great numbers. Perhaps lack of careful annealing was the cause of breakage, but it is next to impossible to tell from inspection if glass has been properly annealed. Glass was found to break rapidly in deep railway cuts where the sun did not strike the insulators till it was quite high, and consequently hot. They were thus suddenly warmed on one side, and the stresses finally caused breakage.

Glass insulators have failed to serve in the moist island climate of England chiefly on account of the hygroscopic, or moisture gathering quality of a glass surface. Most of the leakage is across the surface, hence if moisture be collected the insulation drops to a seriously low value. This is worst in cast glass, because the surface is more or less rough, due to the effect of the walls of the mould. Plate glass is not as hygroscopic, because by grinding and polishing a new surface has been produced, which is very smooth.

The least hygroscopic glass surface is claimed to be that produced by blowing the article. The glass is taken by the glass worker while very hot and plastic, almost fluid. Being blown into shape while in this semi-fluid condition in contact with air alone, the glass particles arrange themselves freely in an exceeding smooth surface according to the law of surface tension. Hardening in this condition the surface is less likely to form dew than is the cast surface.

Acting on this principle, Mr. Brooks, an American, introduced into England a blown glass insulator with a very deep cup, which is much better than the old cast insulators. However, it has not come into extended use.

Brown stoneware insulators are excellent, strong, cheap and durable, but do not have the good insulating qualities of porcelain, hence are used only on unimportant lines. Stoneware does not have the smooth, hard surface of porcelain, but the glaze which it does have will not crack, while that of porcelain sometimes does.

The surface of porcelain is so smooth that it resists the formation of a film of moisture, retains little or no dust, and is easily washed by rain. Grease is a great aid in repelling water and new insulators were formerly dipped while dry and hot into melted paraffine. This had to be discontinued, as the paraffine retained dust very badly and offset any good effect.

MANUFACTURE.

There are two ways of making porcelain insulators, moulding and hand turning. The latter is much preferred since it produces the best quality of porcelain, both in insulating power and mechanical strength.

The quality of the porcelain itself must be of the highest for in the climate of England it will not do to rely on the glaze. The latter is used to make the surface easy to clean so that a rain will wash off the dust, and so reduce surface leakage. But British engineers place chief reliance on the porcelain body for insulation. To cause vitrification ground flint is mixed with the clay. The flint must be of the purest, and the mixture completely vitrified as well as non-absorbent.

If a piece of the porcelain be broken, the fracture must show a glassy appearance. If a drop of ink be placed on the broken surface, where no glaze is present, it must not be absorbed. This test applied to poor quality porcelain or stone ware forms a spot which runs out in all directions as the ink follows the minute porous openings.

TYPES OF INSULATORS.

The standard insulators of the British Post Office, which operates the trunk, or toll, line telephone system of England, differ from American types chiefly by having straight, parallel sides and a differently shaped top. A double petticoat insulator is used for long distance line work. The single petticoat insulator is used only for short and unimportant lines.

*Telephony.

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The standard porcelain insulator is white and consequently forms an attractive target for mischievous persons. A brown colored porcelain has been produced which is less noticeable, and is used in localities where stone throwing is prevalent. It is also provided for regions where people demand an insulator which shall not be noticeable on account of marring the landscape.

ELECTRICAL TEST.

Each porcelain insulator to be tested is soaked in water at 60° Fahrenheit for twenty-four to forty-eight hours. After this it is placed upside down in salt water to within a quarter of an inch of the edge, the inner space being also filled with water to the same level. Usually a whole trough is filled with insulators and each is tested in succession. At the moment of testing a particular cup, a red-hot bar of heavy iron is held close to the edges projecting above the water to drive off the moisture. At the same time testing forks connected to battery and galvanometer are inserted so as to test the inner and outer walls of the insulator.

Tests made under the above conditions give about 50,000 megohms for each insulator, although under favorable conditions as high as 500,000 megohms have been obtained. It is very likely that most of the leakage is across the surface and not through the porcelain. If given a breakdown test with high voltage in dry air, these insulators rarely break down under 50,000 volts.

INSULATION OF LINES.

The actual insulation which is obtained from even these high-grade porcelain insulators is exceedingly variable, depending on the weather. In bad weather the minimum insulation allowed is 200,000 ohms per mile, but on long lines a higher value is expected. If it falls below 100,000 ohms per mile it is time to hunt for faults.

On account of the nature of the climate the spans are somewhat longer than is customary in the United States. Sixty yards (180 feet or 30 poles per mile) is common, but side lines and rural extensions often run as high as 70 yards (210 feet or 25 poles per mile), or 80 yards (240 feet or 22 poles per mile).

Taking the standard of 30 poles to the mile, the above minimum insulation of 200,000 ohms per mile in bad weather means six megohms per insulator. In dry weather the insulation is expected to be from 10 to 20 megohms per mile, or 300 to 600 megohms per insulator.

The worst conditions are encountered in foggy "muggy" weather, especially if it has been dry and dusty just before so that the insulators are covered with dust. In this case the moisture from the fog depositing on the surface of the porcelain, forms a muddy or gummy surface which causes very bad leakage. A brisk rain will improve matters very much by washing off the dust. If, now, the sun comes out and drives off the moisture, a very good insulation is obtained, which increases as the inside of the petticoats dries out, which necessarily takes somewhat longer.

The form of petticoat has a great deal to do with the performance of the line under varying weather conditions and must be taken into account in comparing glass and porcelain. A very deep skirt will give greater insulation in damp weather, because of the longer path which it interposes between the line wire and the supporting pin or bolt. But this type dries out much more slowly, because of the deep cavity in the cup. The blown glass insulator of Brooks manufacture has a petticoat of this character, and although a very good insulator, acts as above described.

Along a certain stretch of railway in England are two particular lines, each two miles long, side by side, one insulated on Brooks glass and the other on double petticoat porcelain of the standard type. On a certain very foggy night the line on Brooks glass measured up 290,000 ohms insulation and the one on porcelain 150,000 ohms. But on the following morning just after the sun had broken out, the line on porcelain measured 2,000,000 ohms, while the line on Brooks glass was only 390,000 ohms. The value of the more shallow type of cup for quick drying out is thus clearly shown, but gives no basis for comparison of glass and porcelain.

In England the spiders give considerable trouble by spinning their webs under the skirts of the cups, and this accumulates dust and moisture to such an extent as to lower the insulation to a marked degree. It has been noticed that spiders do not work on creosoted poles as long as the smell remains. Several means have been devised for preventing this trouble, but the only effectual plan is to clean the insulators at intervals. The work is done in the fall after the spiders have ceased to spin. A brush of proper size is used to reach up into the spaces under the petticoats. Glass is not subject to this trouble, as the inside of the cup is light.

The most serious condition which English lines have to encounter is in smoky factory districts and along the sea coast. In the former case a greasy black deposit accumulates on the insulators which the rain will not remove. Hence, when the leakage gets too bad, the insulators are taken down and cleaned. The process is as follows:

Put three and one-half pounds of soda into a bucketful of hot water and steep the insulators in this for some time. The cups are then taken down and rubbed inside and out with dilute hydrochloric acid (one part of acid to four of water) applied with a woolen or worsted mop. They are then rinsed in clear cold water and all remaining dirt rubbed off with waste. This seems a costly and needless process, but is necessary under the conditions found in the regions mentioned.

Along the sea coast the salt is deposited on the insulators with such bad results that coast line is avoided wherever possible. No kind of protection has proven satisfactory.

METHODS OF MOUNTING.

It is interesting in connection with the subject of insulators to note the methods employed in mounting them on cross arms and the attachment of line

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wires. Wooden pins are not used by the British Post Office, steel pins or bolts being employed exclusively. These pins do not differ materially from those in use in the United States.

To obviate the twisting effect on the cross-arm caused by terminating a line on an ordinary pin, a J-shaped pin or "cup-holder" is used. This provides a straight pull directly from the center of the cross-arm. In dead-ending the wire the end is doubled and then dead ended.

AMERICAN CONDITIONS.

Generally speaking, the porcelain telephone insulator is such a rarity in the United States as to attract special attention when used. Undoubtedly the dry continental climate and the cheapness of glass accounts for the absence of the more costly porcelain. Some manufacturers of both glass and porcelain insulators claim that the advantage of the latter is chiefly mechanical strength and that its insulation is practically no better than glass. But under certain conditions porcelain has proven necessary. On a 30,000-volt transmission line, a telephone line for the operating company's use was carried on the same poles. The circuit was insulated with glass insulators and properly transposed. In spite of this, the telephone line was so noisy that difficulty was experienced in using it. Finally all the glass insulators were exchanged for porcelain, which cleared the trouble and made the line satisfactory.

CONCLUSIONS.

In dry weather and ordinary conditions as in the United States there seems to be little advantage whatever in using porcelain. For the average lines both glass and porcelain give about equal results. For loaded No. 8 circuits, recently installed by the American Telephone and Telegraph Company, the extraordinary high insulation requirements caused the adoption of porcelain, of the moulded, vitrified, glazed type.

In damp weather porcelain maintains its insulation much better than glass, but exact figures giving relative values have not been obtainable. The extreme difference between English and American conditions makes direct comparisons impossible.

In connection with the foregoing article, it will be of interest to refer to a discussion which took place on the subject of insulators at the recent meeting in New York, November 16 and 17, of the Eastern Division of the Association of Railway Telegraph Superintendents.

Mr. L. B. Foley, Superintendent of Telegraph of the Lackawanna Railroad, New York, understood that porcelain insulators benefited transmission and thought that it might be advantageous to use such insulators for train despatching circuits.

Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway's Telegraphs, Montreal, stated that his company had used only porcelain insulators for the past two or three years, but during the present year he had found some of the insulators defective. He obtained his supply from three sources, one in the United States, one in Canada and the third in Germany. The insulators from the first two sources were not of good insulating qualities and are otherwise defective. On some of the company's long telegraph circuits the leakage is quite appreciable. He spoke very favorably of the German insulators and had no fault to find with them. He uses only single petticoat insulators as the climate through which his company's lines pass is very dry.

As to glass insulators, he has found that they were improperly annealed. The breakage averaged fifteen to twenty per cent. in transit. One great trouble was that a month or two after the insulators were put up, they would fall to pieces without injury from any mechanical force. With porcelain insulators they had no trouble of that sort. There is hardly any breakage when received and no breakage afterwards. Tests at McGill University showed that porcelain insulators, even on the petticoat, would stand at least three times the blow that glass would, and on the crown eight or ten times the blow.

Glass insulators manufactured in Montreal cost $29.00 per thousand, approximately three cents each. German porcelain insulators made from the company's specifications cost $44.00 per thousand, approximately 4½ cents each. Those manufactured in Pittsburg and Canada cost 4¼ cents each, but the difference between glass and porcelain is offset by breakage and maintenance.

Public Utilities in Kansas.—A bill is to be introduced in the Kansas legislature to regulate public utilities in that state. The commission will be composed of five or seven members, one of which will give most of his time and attention to the affairs of telegraph and telephone companies and interurban electric railways. All members of the body are to be experts in the special line of investigation covered by the bill.

Present of a Gram of Radium.—A gram of radium has been presented to the British Radium Institute by Sir Ernest Cassel. The radium was purchased from the Austrian Joachunstahl Radium Mining Company and cost $72,000. The institute will use the radium in experiments on the cure of cancer.

An Officious Alderman.—Mr. E. G. Boyer, alderman at Algona, Ind., recently undertook to move the Western Union Company's wires and poles himself because the company did not move them rapidly enough to suit him. In so doing, he chopped down some poles belonging to the Chicago and Northwestern Railroad Company, and crippled the train service. He is now in trouble in consequence of his blunder.

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Impregnated Telegraph Poles.

In the *Zeitschrift für Forst- und Jagdwesen* Mr. K. Havelik, an engineer, of Brünn, Austria, publishes some interesting observations upon the frequent occurrence of the so-called house fungus (Merulius lacrimans) on telegraph poles impregnated with sulphate of copper in the Province of Moravia.

The poles, which by reason of their having been attacked by this parasite had to be removed and replaced with others, were characterized by a sort of dado or wainscoting on the surface of the underground portion, such as one sees on all wood which has been injured by this fungus. On digging up the poles there was noticed an unpleasant fungus odor. This fungus was found wherever the poles were subjected to alternations of dryness and dampness, no matter what the character of the soil in which the poles stood. The seed-bearing or germ-bearing parts were almost always on the southeast side of the poles wherever that was shielded from the sunlight. In other cases they were found on that side which was most protected from the direct rays of the sun. The form of these germ-bearing portions is various, depending on the neighborhood and the degree of dampness. If the neighborhood of the pole is sufficiently damp the fertile portions are quite high up and have a bracket-like form. If, however, the earth surrounding the pole is dry, they commence lower down and there is manifested an endeavor to reach the surface of the soil.

The life of poles attacked by the Merulius lacrimans is from two to fourteen years; where there is sudden alternation of dampness and dryness the pole rots away sooner. The formation of the Hyphen can also be observed. The thread-like germs of this fungus always lie in the lengthwise cracks of the wood and are often quite deep. The more quickly the earth about the pole dries the larger are the threads, but the Hyphen itself is seldom to be found here. Where the earth dries more slowly, there are formed either weaker threads or none at all. The Hyphen usually branch out all around the pole.

In order to counteract the influence of the house fungus the Austrian Telegraph Department has introduced impregnation with tar, which is regarded as a sure preventive of the Merulius.

The Imperial German Postal Department has recently published statistics concerning the life of telegraph poles, as well as their durability.

The average life of the poles was as follows for different impregnating materials: Zinc chloride, twelve years; copper sulphate (blue vitriol), fourteen years; corrosive sublimate, seventeen years; tar oil, twenty-two years.

The annual cost per cubic meter treated and delivered was as follows for the several impregnating materials: Zinc chloride, 4 marks; copper sulphate, 3.50 marks; corrosive sublimate, 3.10 marks; tar oil, 2.80 marks.

These figures show that impregnation with tar oil paid the best, that with corrosive sublimate the next best, and that with zinc chloride the least.—*Electrical World.*

Submarine Cables for Long-Distance Telephone Circuits.

Major W. A. J. O'Meara, engineer-in-chief of the British post-office, presented an interesting paper on "Submarine Cables for Long-Distance Circuits," at the meeting of the Institution of Electrical Engineers, in London, December 15, 1910. An abstract of the paper, taken from the Electrical Review and Western Electrician, is given below:

After recounting many historical incidents in the laying of telephone cables since 1891, Major O'Meara dwelt on the great value of the theoretical work of Oliver Heaviside in pointing out the importance and beneficial effects of self-induction and stating the relation which must exist between the constants of a circuit in order that electrical waves of all frequencies may be transmitted without distortion. In 1891 Prof. S. P. Thompson had secured a patent on the use of inductances to improve telephonic and similar circuits. The chief reason why this had not been done earlier was the difficulty in manufacturing the requisite cables. In fact, for a long time it seemed impossible to use this idea and it was felt that improvement must come by the reduction of the electrostatic capacity of the cables. An opportunity to verify this opinion came in the laying of a cable to the Isle of Wight, for which there was selected an air-space type of cable about two knots long that was laid in 1897. As it seemingly proved entirely satisfactory, a similar cable was laid between Ireland and Wales. The much greater length of the latter cable quickly showed its inherent defects, for both pairs of conductors could not be used simultaneously without troublesome overheating due to serious inductive disturbances. Extended experiments showed that this type of cable could not be manufactured so as positively to eliminate inductive troubles between the two circuits and therefore it was unsuitable for long distance telephony, although excellent for telegraphy.

In 1908 it was decided to lay an additional telephone cable between England and France, and the question of the type of cable most suitable for increasing the possible range of telephonic communication naturally came up again. Three methods of doing this presented themselves. (1) By the use of heavier copper wires and increased space between them. (2) By providing one or more closely arranged layers of iron wire over the entire length of the conductors, that is, by the "continuous" loading system. (3) by the introduction at regular intervals of suitable inductance or loading coils, that is, by the "coil" loading system. The first did not seem practicable after some deliberation and was therefore given up. The "continuous" loading was first regarded as

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the more desirable on account of its evident mechanical simplicity as compared with the "coil" loading. The increased efficiency expected to result was, however, found to require an incommensurable increase of cost. Moreover, it was found that it is almost impossible to predetermine the results to be expected with reasonable accuracy, owing to difficulty in attaching correct values to the electrical constants involved in the calculations. Exhaustive investigations have not revealed any certain way of determining what some of these constants, such as the permeability of the iron after winding, are likely to be. Therefore it was practically decided to use the "coil" system of loading. An artificial test cable was constructed on this plan with gratifying results. The final specifications for the Anglo-French cable provided for dimensions of the copper and gutta percha identical with those of the existing Channel cables, so that in case of failure of the loading coils these could be cut out and a cable of as good qualities as those cables would result. It was specified that either the "continuous" or "coil" loading should be used, but that the attenuation constant should not exceed a certain definite value. No bids were received for a "continuously" loaded cable, but three were received for a "coil" loaded cable.

These loading of Pupin coils in the finished cable possess the following features: Two double coils, required for the four conductors of the cable, are inserted at intervals of one knot (1.153 miles), except the coils nearest the ends are inserted at only one-half knot from each terminal apparatus to diminish reflection losses. Each coil has a resistance of close to six ohms and an inductance of 0.1 henry at a frequency of 750 cycles per second. Each double coil consists of two windings on the same iron core and one winding is connected in series with each conductor. The total length of each joint is 30.75 inches. The mechanical problem of building and inserting the coils was more serious than the electrical problem.

During manufacture the cable was continually inspected and frequently tested. The manufacturers were Siemens Brother & Company, who also undertook the laying of the cable on May 5, 1910. Great care was taken in this work to prevent damage to the loading coils, but everything was carried out without any damage being done to the cable.

A most complete success was achieved in the entire undertaking and extended tests on the cable have shown its excellent qualities. A total length of 1,700 miles of unloaded overhead lines may be added to the ends of the cable before a commercial grade of conversation over the composite circuit will fail.

Balancing Quadruplexes and Duplexes.

BY FRANK M. CRITTENTON, HARVEY, ILL.

The discussion now going on in the columns of Telegraph and Telephone Age for and against the method of balancing to the distant battery is very interesting, and as the writer has devoted many years to this line of work, his experience and conclusions may be of further interest in this connection. The method of balancing to the distant battery was used by me at Omaha, Neb., in handling the old "Overland" circuits in the early eighties.

In managing circuits the prime consideration is, first, to keep the business moving, and anything that will help to do this should be utilized. My method of balancing a polar duplex is to obtain an open or closed key at the farther end of the circuit, bias the polar relay tongue until the magnetic pull of the distant battery is met evenly by the bias, adjust the line balance and the static also,—the former by adjustment and touch, and the latter by changing the capacity in the condensers until there is no disturbance from my own signals,— then move the tongue of the relay as required in order to even the percussion on the points and the balance is complete and on a working basis. In the case of a wire where the normal balance is over 6,000 ohms, and in changeable weather, it is well to balance to both poles of the distant battery. It sometimes happens that there is a difference in the shape of some slight escape to either positive or negative, due to the condition of the wire, which can be offset by taking the mean balance or the difference between the balance to positive and negative batteries. On a short wire there is little need of stopping the work to balance, as adjustment of the resistance coils can be made to meet any humidity changes by the simple act of observing cause and effect. We know that increasing humidity requires decreasing the artificial resistance in order to balance the incoming signals and smooth them down, and a decrease in the humidity needs contrary action. The only difference in balancing a quadruplex is that you call on the distant office also to leave his long end off and you balance to his smaller potential the same as on the duplex.

For the balancing of static I probably differ in method from most quadruplex handlers in the fact that I like to bias the polar relay backward in order to meet the current pull from the other end. Then, if my signals come reversed on the polar relay I insert pegs until the fault disappears, and when my relay follows the key, I take the opposite course.

Balancing to the distant battery undoubtedly saves time in the handling of multiple circuits. Many times I have had distant offices stop work for ground balances and insisted upon the performance being gone through with, when no change was apparent by balancing either way.

How to Balance a Quadruplex.

BY D. B. GRANDY, ST. LOUIS, MO.

Although the subject, "How to Balance a Quadruplex," has been threshed out several times in the columns of Telegraph and Telephone Age and other publications in years past, it seems to be of perennial interest. Some five or six years ago, the late E. L. Bugbee, of Washington, described, in your columns, the method of balancing to the distant battery by feeling the armature of the polar relay, and

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showed the great advantage of this method as a time-saver.

A discussion of this subject took place about twelve years ago and was participated in by Messrs. A. C. Terry, O. K. Newton, Charles Thom and other recognized experts. In a contribution to that discussion, I described the method I had used from the time of the introduction of the quadruplex, as follows:

"The best method, for the amateur, is to follow the beaten track. Get a ground at the distant end, center your polar relay, and proceed as laid down in the books. But, if the amateur is quick to learn, experience will soon teach him that the polar relay will work well, even when considerably out of balance, while the neutral relay requires a very delicate balance and adjustment. Therefore, a perfect balance of the neutral relay is the best possible balance for the whole apparatus, and such a balance can be quickly obtained by turning the neutral relay down and balancing to the 'short end' at the distant station as well as, and under some conditions, better than to a ground, and will often save time."

I may add that this method was suggested to me and doubtless to others by the fact that during the experimental stage of the differential duplex on the old Franklin line, we used to balance to the open key at the distant end, and the consensus of opinion in the discussion referred to favored this method as applied to the quadruplex.

In the case of the polar duplex, with the old style polar relay, it was easy to adjust the tongue to any position and thus get a balance to distant battery, but with the modern form of relay this cannot be done without changing the contact screws on each side, and the balance can be more readily obtained by "feeling" the armature, as described by Mr. Bugbee.

New Books.

Elementary Telegraphy. By H. W. Pendry. New York: Whittaker and Company. 216 pp., 200 illus. Price, $1.50.

This is a manual for students and was written especially to meet the requirements of the ordinary grade of the subject as published in the syllabus of the City and Guilds of London Institute. While the work is written from an English standpoint, as far as the practice of telegraphy is concerned, it contains much matter of general interest. The underlying principles of course are the same in any country, but in this instance they are set forth in a very clear manner. The American student of telegraphy will no doubt find this part of the book of special interest, as it explains many things that are not always stated very clearly in other books of like character.

The section devoted to telegraph instruments and practice will be of interest to those who care to look beyond the American shores in matters pertaining to telegraphy. It is well to know how things are done in other countries besides our own, and a study of this section will aid in broadening the mind.

There are six chapters and an appendix, each chapter being supplemented by a list of questions, or exercises, on subjects covered by the related chapter.

This or any other book on electrical and kindred subjects can be supplied by Telegraph and Telephone Age, 253 Broadway, New York.

Electricians Operating and Testing Manual. By Henry C. Horstmann and Victor H. Tousley. Chicago: Frederick J. Drake and Company. 360 pp., illus. Price, $1.50.

The design of this work is to instruct the practical electrician in the management, operation and testing of the more important electrical devices now in use. The method adopted has been that of familiarizing the student with the underlying principles governing the design of motors, dynamos, arc lamps, etc. Telegraphy and telephony are not considered at all. As far as it goes, however the work will be found very useful along the lines indicated, and students in telegraphy and telephony would find it to their advantage to broaden their minds by studying the general applications of electricity, and not confine their attention to telegraphy or telephony alone.

There are no mathematics employed in this book, and it is very well illustrated, the diagrams of connections being especially commendable.

Brookes' Automobile Handbook. By L. Elliott Brookes, and Automobile Mechanician's Catechism, by Calvin F. Swingle, have been issued by Frederick J. Drake and Company, Chicago.

The former work gives practical information for the use of owners, operators, automobile mechanics and technical schools, and is a strictly up-to-date treatise on the subject of automobiles. The price is $2.00.

The latter work consists of over 400 examination questions and answers prepared expressly for the use of owners, chauffeurs, garage men and automobile machinists. The price is $1.25.

Old Time Telegraphers and Historical Association.—The official report of the proceedings of the twenty-ninth annual reunion of the Old Time Telegraphers and Historical Association, held at Chicago, September 8, 9 and 10, 1910, has been issued. It is a very handsome and artistically gotten up book of 132 pages and is liberally illustrated with portraits of prominent members of the association and its committees, and with views of points of interest in and around Chicago. The book is printed on fine coated paper and will form a valuable and important addition to the literature of the Association. The cover is embossed and is an artistic piece of work. Great credit is due Mr. Franklin J. Scherrer, secretary of the association, 30 Church Street, New York, under whose direction this excellent work was produced.

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Telephones on the Southern Railway.

The Southern Railway has recently placed in service 125 miles of telephone circuits, not only for dispatching, but for message work and "blocking" as well. The telegraph has been relegated to through business exclusively between Greensboro, N. C., and Monroe, Va.

The line consists of two complete No. 9 B. and S. gauge copper circuits, the wire weighing 420 pounds per circuit-mile. One of these circuits is used for train order work. The other is employed for message business. Transpositions are cut in every quarter of a mile in alternate circuits, and in addition provision has been made for a future phantoming of the two telephone circuits. In addition, a grounded block wire made up of an old No. 8 BWG telegraph wire is used from station to station.

All the selectors and telephone apparatus are mounted on backboards in each office. Fig. 1 shows

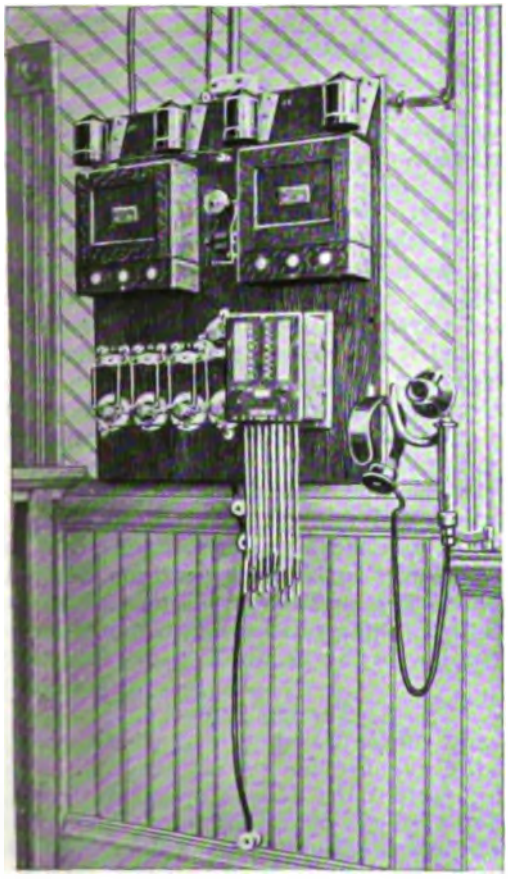

FIG. 1. APPARATUS IN A WAY STATION.

one of these backboards at a way-station. The outside wires are brought into each office through circular loom cable which runs directly to the protectors shown at the top of the mounting board. These are carbon block arresters, manufactured, as is all of the rest of the telephone apparatus, by the Western Electric Company. From these arresters the lines are cabled to the test panel, which is shown in the lower right hand corner of the board.

This test panel consists of two rows of telephone jacks with designation strips beside them. By means of these jacks, it is possible to make various simple tests on the circuits, and to patch around breaks in case of trouble on the line. A grounding jack is also provided in this panel, together with two keys for throwing the operator's telephone set on either set of cords. In the middle of the board are mounted the selector sets, one on the train wire and one on the message wire. Between these sets is placed a bell which is connected to the signals on what is known as a blocking set. Below the selectors and to the left of the test panel appears the secondary system of protection, which consists of fuses and carbon arresters. These fuses protect the line in case of crosses with power or lighting circuits, and the arresters operate at a lower voltage than the primary arresters at the top of the board. From these protectors the circuits go to the various pieces of telephone apparatus. All way-stations are equipped with flexiphones and head telephone sets, which form a most flexible and convenient arrangement for the operators.

The blocking set makes it possible to use one telephone instrument in connection with either a block wire north, a block wire south, the train wire, the message wire, or a private line, and it permits con-

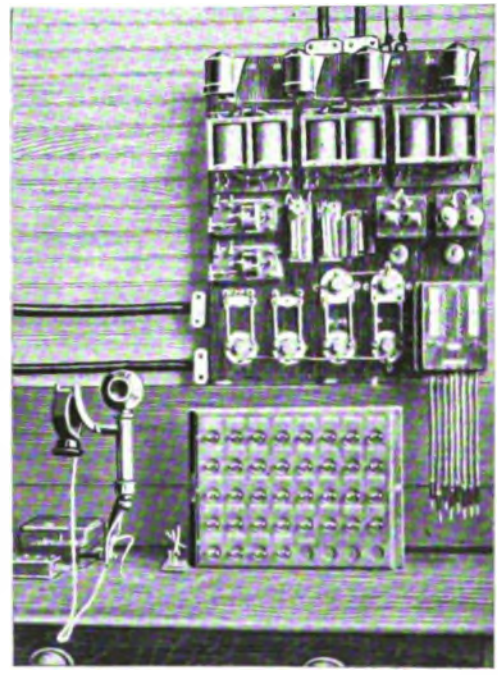

FIG. 2. MESSAGE OPERATOR'S APPARATUS.

nections to be made between adjacent block and between metallic and grounded circuits such as the train wire and the block wire. This set, being in almost constant use by the way-station operators, is located in the most convenient spot.

The terminal apparatus at the message operator's desk in Greensboro is shown in Fig. 2. It is thoroughly protected, and it also has the test panel for making patches and simple tests on the line. Switch-

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ing arrangements are provided here, as well as at the dispatcher's desk, so that either the dispatcher or the message operator can put his telephone set on either circuit. The telegraph relays, condensers, retardation coils, and other auxiliary apparatus are placed on the terminal board. An extension bell is provided for both the train and message circuits. This is in order that the way-station may ring up the operator at Greensboro, if for any reason he is not connected in on the circuit.

Subscribe for Telegraph and Telephone Age.

The January 1 issue, which is an important directory number, is a paper that every member of the profession should possess. It contains ninety-two pages of valuable information. Mr. Willis H. Jones describes some important telegraphic apparatus in his usually lucid style, while Mr. John F. Skirrow has an article on Postal Branch-Office Wiring which is also an important contribution to practical telegraphic literature. Considerable space is given over to Postal and Western Union executive offices notes, changes in administration, etc., all of which is intensely interesting at this time. Several pages are devoted to miscellaneous items of an absorbing nature while an extensive obituary of S. S. Dickenson, a vice-president and general superintendent of the Commercial Cable Company, is printed.

Of the many interesting features are a full page engraving of the new president of the Western Union Telegraph Company, Mr. Theo. N. Vail, and a similar one of Col. R. C. Clowry, the retiring president of that company, printed on the finest coated paper and suitable for framing. Lengthy biographical sketches of these officials also appear. More than twenty pages are given over to a directory of the telegraph and telephone companies and their officials, railway telegraph superintendents, fire and police telegraph superintendents, the cable and other interests together with the names of seven or eight hundred managers of Western Union and Postal offices throughout the country. A vast amount of other valuable and interesting information which every telegrapher should be familiar with also appears, all of which go to make one of the best productions of a telegraphic nature that has ever been placed before the fraternity. The directory feature of this issue makes it of so much value that it will be at the elbow of everyone concerned ready to refer to at a moment's notice during the entire year of 1911.

Another feature of practical importance in this issue is the article giving the standard electrical notation and the definitions of electrical terms now in general use.

The Morse and Continental Alphabets used by the telegraph, cable and wireless companies throughout the world are also shown.

In addition to all of this valuable and interesting matter is an index of the contents of the twenty-four issues of Telegraph and Telephone Age for 1910.

The price of this issue is twenty-five cents, and if you have not already obtained a copy, we would advise you to order one at once before our supply of extra copies is exhausted.

If, however, you have a copy and you realize the value of the same, kindly pass this information to someone you think will be interested. Those desiring to begin their subscription with this number can do so without any extra charge. The terms of subscription are $2.00 per year, or $1.00 for six months; Canadian subscriptions, $2.50; foreign subscriptions, $3.00.

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Interstate Commerce Commission Report.

The twenty-fourth annual report of the Interstate Commerce Commission was submitted to Congress December 21. By the act of June 18, 1910, telegraph and telephone companies doing an interstate business were placed under the jurisdiction of the commission. Steps have been taken for the formulation of a system of operating tariffs for these companies, and it is expected that this system will become effective on July 1, 1911.

Concerning the application of the law as to telegraph and telephone companies, the report says: "There are from 25,000 to 30,000 telephone companies which make provision for interstate communication, and the commission is in doubt as to whether it was the intent of Congress to place all these companies under its supervision and control. No opinion is expressed at this time as to the administration's interpretation which should be placed upon the law in this regard."

Testing Bridge.

In any office or laboratory where testing is done, the expense for testing, and the delay in locating faults must depend upon the time necessary for a single determination. The reliability of the results depends on the accuracy of the apparatus and the simplicity of the calculations. Calculated results are always less certain than results reached by inherent process which can be read direct from the setting of the rheostat dials. The Friendly testing bridge, made by Messrs. W. and L. E. Gurley, Troy, N. Y., is designed with an appreciation of these conditions. It is a high grade and reliable instrument, it is quick in obtaining measurements, the results are read direct from the rheostat dials, and the only calculation consists in pointing off decimal places or in adding ciphers.

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The bridge is available for the measurement of resistances as a Wheatstone Bridge, faults may be located by the Varley or Murray loop methods, or by a new method known as the Friendly Loop.

The bridge is compact and the resistances are of manganin wound on metal spools and adjusted to an accuracy of 1-10 of one per cent. A new and ingenious arrangement of the ratio coils has been adopted, permitting unusual ratios, and a new construction for the decade dials maintains low resistance contacts and smoothness of motion with very small wear. This construction permits a continuous motion of rotation in either direction. There are ten units in each decade, and the galvanometer is of the moving coil type and is of high sensibility. Any other galvanometer may be connected, if desired. The cover may be removed entirely and it is provided with dust tight openings, so that the box can be closed and locked without disconnecting the wires leading in.

Municipal Electricians.

The Chicago Stock Yards Fire.—Fire Marshal James Horan, of the Chicago fire department, who was killed, with twenty-two of his men in the disastrous fire in the Union Stock Yards, December 22, was a telegraph and telephone lineman before he entered the fire department. He had many friends among electrical men. Mr. B. E. Sunny, president of the Chicago Telephone Company, called the first meeting to raise funds for the relief of the families of the dead firemen.

Recent Fire Alarm Patents.—Among the patents issued January 3, was one (No. 979,769) for an Electric Signaling Box, to A. Kempston, San Francisco, Cal. It comprises a fire alarm for preventing interference of signals by holding a box in a position so that it will start its signal to the main office after another box has completed its round of signaling and thus hold the other boxes till it gets through with its signal. Patent No. 979,977 was issued to E. Mahon, Fairfield, Iowa, on an Electric Fire Alarm. The alarm and a circuit closer are operated by a float in a liquid.

Automatic Fire Alarm is the subject of patent No. 979,376 issued to L. Cain, Caledonia, Mich., on December 19, 1910.

Patent No. 975,175 has been granted to W. J. St. Onge, Elyria, Ohio, for an Alarm System.

International Association of Municipal Electricians.—The proceedings of the fifteenth annual convention of the International Association of Municipal Electricians, which was held at Rochester, N. Y., September 6, 7, 8 and 9, 1910, have been issued in book form. The volume is neatly bound in cloth and has 168 pages, including portraits of the officers and some of the members of the executive committee. Fine paper is used and altogether the results reflect great credit upon the editorial ability of ex-Secretary Mr. Frank P. Foster, of Corning, N. Y., under whose direction the work was issued and who is succeeded as secretary by Mr. Clarence R. George, city electrician, of Houston, Tex.

Directory of Municipal Electricians.—In the list of municipal electricians printed in the Directory of telegraph, telephone, cable and wireless companies and associations, in our issue of January 1, the following four names were inadvertently omitted: James Warren, superintendent of fire telegraph, New Brunswick, N. J.; W. E. Walgamott, city electrician, Peoria, Ill.; J. W. Waggoner, superintendent of fire telegraph, Roanoke, Va., and J. B. Yeakle, superintendent of fire telegraph, Baltimore, Md.

Fire Alarm Boxes in Rochester, N. Y.

The 300 fire-alarm boxes in Rochester, N. Y., are lighted at night by an incandescent lamp enclosed in an outer red globe. In describing the system *The Electrical World* says no change was made in the fire-alarm posts, a special fitting at the top being equipped with a shade holder and a 40-watt, clear-bulb, tungsten lamp over which is a red globe with the words "Fire Alarm" etched in it. The lighting circuit to the post is run underground either from the underground system or from a pole line, the leads in the latter case passing down the pole in conduit to the fire-alarm box. Where the lighting circuits are on the opposite side of the street the circuit is placed underground in an iron pipe, a single conductor being used for one lead and the pipe itself for the other lead. The small transformers used in connection with the system are in most cases set in the manholes adjacent to the fire-alarm posts.

Every fire-alarm box in Rochester is now easily discernible at night for a great distance. When looking down a main thoroughfare the red lights thrust themselves into view like so many danger signs along a brightly lighted roadway, and the plan has given complete satisfaction ever since its installation a few months ago.

Telephones in Philadelphia Terminal of Pennsylvania Railroad.

The Pennsylvania Railroad is installing a telephone system of controlling train movements at its Philadelphia terminal. This is believed to be the first installation of a complete telephone dispatching system within the limits of a terminal. This system is unique, being in some measure a telephone train wire having intercommunicating features only between certain points. Dispatchers' offices are located at the tower at Thirty-second street, which is a telegraph office, and at the tower at Seventeenth street. At the latter point three calling equipments are provided, which enables any one of the three operators to call any station, while at the former tower only one calling equipment is provided. The various way stations, of which there are fifteen, can call either tower automatically, but there is no provision for calling the other way stations. Accordingly both dispatchers' offices are equipped with selectors, as are the regular way stations.

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Line Testing by Indicating Instruments.

The following article, prepared in the office of Mr. W. E. Athearn, engineer of equipment of the Western Union Telegraph Company, New York, is reproduced, in slightly abridged form, from the current number of *The Journal of the Telegraph*:

All wire chiefs have felt the need, at various times, of a better instrument than the Morse relay for testing the line wires under their care. This need has been partially met by furnishing portable voltmeters and mil-ammeters for use at many important switchboards, but the difficulties attending the handling of such instruments on a busy, crowded board have made them somewhat unsatisfactory. In order that the full benefits of voltmeter and mil-ammeter tests may be secured by the Plant Department in their work of maintaining the company's circuits at the highest possible efficiency, the engineer of equipment has designed a combination volt-mil-ammeter set arranged for convenient operation at the switchboard.

SUMMARY.

Indicating instruments, such as the voltmeter and mil-ammeter, are better than the usual Morse set for all line testing purposes. The switchboard volt-mil-ammeter, Fig. 1, has therefore been designed for this work. Its scale reads 200-0-200 volts or milliamperes, and its resistance is 20,000 ohms when used as a voltmeter, or less than one ohm when used as a mil-ammeter.

This meter is to be installed as shown in Fig. 5, at stations where wire chiefs are responsible for line conditions.

Theory shows the adaptability of the voltmeter for measuring high resistances, such as insulation resistances of telegraph lines in good weather, and the adaptability of the mil-ammeter for measuring telegraph currents, also for measuring and comparing insulation resistances of telegraph lines in bad weather.

In general tests, meter readings are not usually recorded, but are valuable for comparison with tables or with similar readings obtained on other wires.

In insulation tests, voltmeter readings are recorded and calculations made to determine whether or not the standard insulation resistance of 100 megohms per mile is being maintained. When used for making voltmeter tests, the regular switchboard battery is automatically cut off.

GENERAL.

The tests of wires made at a telegraph switchboard are for the purpose of detecting faults, which may be divided into the following classes:

(1). Grounds, including escapes from wire to ground, and wires swinging to ground.

(2). Crosses, including escapes from wire to wire, and wires swinging together.

(3). Opens, including "partial opens" due to high resistance connections in the circuit.

On account of its convenience and the rapidity with which it may be applied, the Morse relay is largely used for making these tests, and in experienced hands gives fair results. It is never, however, as satisfactory as an instrument which accurately indicates the condition of the wire under test, and for this reason there has been a decided tendency in recent years to use a voltmeter or mil-ammeter for these tests. The combination volt-mil-ammeter has therefore been designed with a view to its general use in wire testing, and the arrangement of the meter and its connections is such that it can be applied with nearly the same speed as a Morse set, while capable of much greater accuracy in the tests made. The instrument may be used either as a voltmeter or mil-ammeter, and has a scale reading 200-0-200, i. e., the needle or pointer is normally in the center and moves to the left or right, depending upon the direction of the current passing through the coils, the maximum reading on each end of the scale being 200 volts when used as a voltmeter, or 200 milli-amperes when used as a mil-ammeter. The connections of the instrument for the various tests are made by the insertion of a plug in one of four jacks mounted in a box just below the meter, and the connection with the line to be tested is effected by a cord carrying a switchboard wedge which fits the usual line spring jacks.

It is intended that one of these instruments shall be provided for every two sections of fifty-wire switchboard at stations where wire chiefs are responsible for the condition of lines.

INSTALLATION.

The volt-mil-ammeter is furnished with a voltmeter mounting which consists of a swinging arm bracket equipped with a jack box on the stationary base of the bracket, while the swinging arm is arranged for carrying the meter. The jack box contains four Western Electric Company's No. 91 jacks, and attached to the box by a short cord or chain is a connecting plug which may be inserted in any one of the four jacks as required for the various tests.

OPERATION.

The voltmeter is a special form of galvanometer, that is, an instrument for measuring current, but it is arranged to have such a high resistance (20,000 ohms in the case of the volt-mil-ammeter here considered), that the amount of current which can be passed through it is extremely small, and the scale of the instrument is so marked that the needle or pointer indicates the voltage being applied to its terminals. For example, if we connect a 200-volt battery or dynamo to a 20,000 ohm voltmeter as per Fig. 2, the current flowing will be ten milliamperes; since by Ohm's law the current equals the voltage divided by the resistance, 200 volts divided by 20,000 ohms gives 10/1000 of an ampere, and a milliampere is 1/1000 of an ampere. But the voltmeter needle will point to 200 when such a current is present indicating that the voltage applied has that value. If the current were five milliamperes the needle would point to 100, as that would be the volt-

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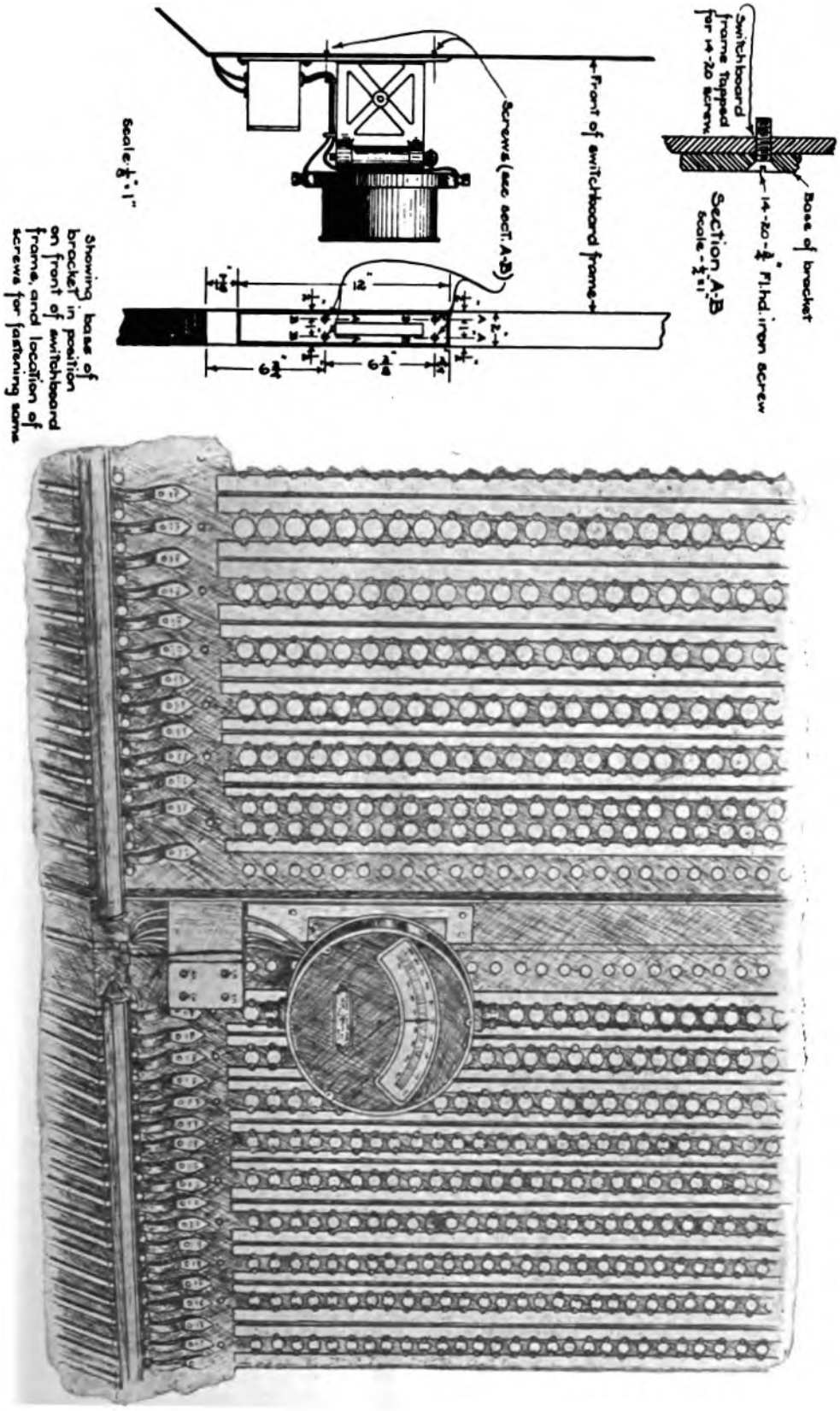

FIG. 1. SECTIONAL AND GENERAL VIEWS OF VOLT-MILAMMETER.

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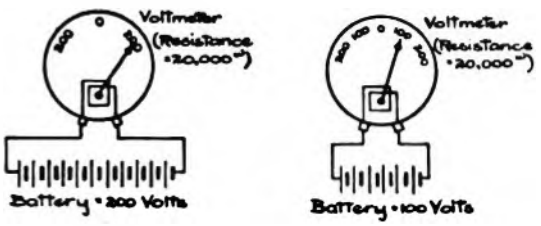
age applied to the volt-meter terminals when such a current was flowing, since $\frac{100 \text{ volts}}{20{,}000 \text{ ohms}} = \frac{5}{1{,}000}$ ampere. This condition is shown in Fig. 3. But instead of reducing the voltage of the battery from 200 to 100, we might have reduced the current from ten milliamperes to five milliamperes by increasing



FIGS. 2 AND 3. CURRENT READINGS.

the resistance of the entire circuit from 20,000 ohms to 40,000 ohms as shown in Fig. 4, that is, by inserting a resistance of 20,000 ohms in series with the 20,000-ohm voltmeter.

If we had added 60,000 ohms to the 20,000 ohm meter making a total resistance of 80,000 ohms, the 200 volt battery would have caused a current of two and one-half milliamperes to flow, or one-fourth as much current as we had in Fig. 2, and the needle would have indicated fifty volts which is one-fourth of the 200-volt reading obtained in Fig. 2; the 20,000 ohms resistance in the voltmeter is also one-fourth the total resistance (80,000 ohms) in the circuit. In other words, the voltmeter reading always bears the same proportion to the total voltage, as the voltmeter resistance does to the total resistance in circuit. For example, in Fig. 4, the voltmeter

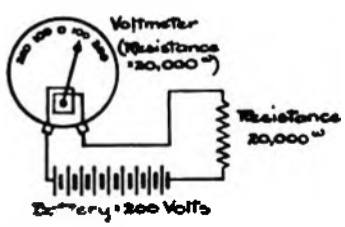


FIG. 4. READING WITH ADDED RESISTANCE.

reading 100 is to the total voltage 200 as the voltmeter resistance, 20,000 ohms is to the total resistance 40,000 ohms. We may look at this in another way: The voltmeter reading being proportional to the voltmeter resistance, the difference between this reading and the total voltage is proportional to the resistance in the circuit outside of the voltmeter, or, if

e=voltmeter reading,
Rv=voltmeter resistance,
E=total voltage,
K=resistance of circuit outside of voltmeter; then e : Rv : : E — e : K.

Applying the "rule of three," we get the formula:—

$$K = \frac{E - e}{e} \times Rv.$$

From this it will be seen that the voltmeter may be used to measure resistances; in fact, within certain limits it is well adapted for such use and the above formula is the one on which calculations are generally based. Now in all tests of wires the resistance is one of the most important matters to be determined; if a wire is "clear" we want to know how clear it is, i. e., what the resistance is between it and other conductors such as the ground or neighboring wires, this being known as its "insulation resistance;" or if a wire is grounded, leaky, or crossed, it is important to have some idea of the resistance of such a fault. When using a Morse relay for making these tests, the wire chief makes a rough estimate of these resistances by feeling the "pull" of the magnets on the armature, noting that the wire is "very clear," "slightly leaky," "very leaky" or "grounded." It is plain that these decisions may vary widely with different wire chiefs, and that at best the results obtained cannot be expressed in such a way as to be comparable with similar results obtained on other wires or at other stations. When the voltmeter or mil-ammeter is used, however, the wire chief can say in figures how well insulated the wire under test is, or how high or low the resistance of a fault is; the latter feature being of value in making location tests by the Wheatstone bridge and in directing linemen.

The mil-ammeter, like the voltmeter, is a special form of galvanometer; unlike the voltmeter, however, it is arranged to have a very low resistance, usually a fraction of one ohm. It can therefore be connected in series with a circuit in which current is flowing and will make no appreciable difference in the value of this current. The scale of the instrument is marked in milliamperes and the needle or pointer indicates the current flowing in these units. If the voltage applied to a circuit is known, and the mil-ammeter is inserted in that circuit, a simple application of Ohm's law will enable us to determine the resistance of the circuit. For example, a circuit fed by a 200 volt battery gives a mil-ammeter reading of 100; the resistance equals 200 volts divided by $\frac{100}{1{,}000}$ ampere, or 2,000 ohms. It the reading had been 200 milliamperes, the resistance would have been 200 volts divided by $\frac{200}{1{,}000}$ ampere, or 1,000 ohms. These figures give us a good idea of the relative values of a voltmeter and mil-ammeter when used for measuring resistance. It has been determined that the best point at which to change from the voltmeter to the mil-ammeter in measuring resistances is when the deflection of the voltmeter needle exceeds 75% of the testing battery voltage, e. g., in making resistance tests with a 200 volt battery we would discard the voltmeter whenever the deflection exceeded 150 and resort to the mil-ammeter instead.

(To be Continued)

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The Military Telegrapher in the Civil War.

PART LII.

In time of war among the most important things to learn at the front are the strength, plans of the enemy, etc., and every device and subterfuge is resorted to to achieve the purpose. Anything and everything is fair in war. Usually it is extremely difficult, if not impossible to obtain such information, as men are at such times suspicious and on their guard and are likely to deceive inquirers and throw them off the scent. Occasionally, however, it happens that the enemy comes into possession of important information by good luck, or chance, or whatever it may be called, and the story given below emphasizes this fact in an interesting manner.

Mr. E. T. Chapman, an operator in the civil war, in a report to Captain W. L. Gross, assistant quartermaster and assistant superintendent of Military Telegraph, dated Lexington, Ky., January 2, 1865, relates his experiences in the Confederates' country in connection with General Stoneman's raid into Western Virginia. He says in part:

"I have the honor to submit the following report of Major-General Stoneman's raid into Western Virginia so far as it relates to the Confederate telegraph lines. We entered Bristol on the morning of December 14, at two o'clock, capturing without resistance the property of the Virginia and Tennessee railroad, all government property and the telegraph office on a line of which Mr. S. Morris, of Richmond, was president. Our arrival was so unexpected that the telegraph operator, Mr. Fred Montgomery, formerly of Lynchburg, and the bookkeeper, were taken prisoners while engaged in playing cards in their office. By order of the general commanding, I took charge of all books, papers and other property belonging to the telegraph company. A main battery of the Grove type was located here and was in good order, earthen jars being used in place of glass. Brevet Major-General Burbridge had previous to our arrival at Bristol instructed me to make any Confederate operator whom we might capture do all the telegraphic manipulating and in case he said anything over the line not dictated by me to shoot him instantly. At 8 a. m., the hour for opening the offices for business, Abingdon called Bristol and asked if any 'Yanks' were or had been there, suspecting that there had been from the fact that a party of Confederate soldiers had escaped capture and gone to Abingdon. Under the circumstances, I deemed it best to send the following dispatch: 'A small Yankee scouting party appeared in town this morning about two o'clock; remained but a few moments and retreated in great haste toward Kingsport, Tenn.' A similar inquiry was made by Lynchburg to whom the same answer was given. When the business of the day began, Abingdon and Lynchburg sent a great number of messages to Confederate government officials (supposed to be at Bristol) and to private citizens. Among the dispatches on file at the office when I entered were some from General Duke to General Breckenridge, Breckenridge to Duke, and Vaugher and Duke to Breckenridge, which, together with the information obtained over the line during our occupation of the office gave us full and accurate information of the enemy's strength, position and intended movements. I may here state that while working the line I received an Associated Press report from Richmond and also General Breckenridge's orders from the Confederate War Department.

"From what I saw of the telegraph line it was well constructed and, according to Mr. Montgomery, the Confederate operator, the best working line in the Confederacy. The wire was about No. 10 gauge and installed with glass 'egg' insulators. The main battery consisted of about thirty jars.

"At 3 p. m. all government, railroad and telegraph property was set on fire, and we then proceeded toward Abingdon, arriving there about midnight. I went at once to the telegraph office, but the operator had left. We, however, captured the instrument and one very important dispatch from General Duke to Breckenridge. As nothing could now be done in the way of telegraphy, the Confederates being apprised of our approach, we proceeded to destroy the line. Owing to the limited facilities for transportation we were obliged to destroy all the telegraph instruments, as we could not take them with us. After leaving Abingdon a portion of the command proceeded to Wythville where they captured and destroyed an instrument and battery. After our fight with Breckenridge near Marion we proceeded to Saltville, at which place there was no telegraph office.

"From Mr. Montgomery I learned that commercial operators in the Confederacy were receiving $200 (Confederate money) per month, and army operators, $90 and rations. In conclusion, I have the satisfaction of saying that the General Commanding acknowledged to me that the success of the expedition was attributable in a great degree to the information derived from the Confederate telegraph line."

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER XXXI.

What is a loop switch?

What are the principal uses to which the spring jacks are put?

What is a "flip"?

In wiring a loop switch how should the spring jacks be arranged?

How are the lamp sockets arranged?

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How is the lamp for a leg of a given loop located?

How does the wiring and arrangement of spring jacks in the loop switch, as practiced by the Western Union Telegraph Company, differ from the method of the Postal Telegraph-Cable Company?

Describe the main features of construction of a main-wire switchboard.

What are single and double "flips" used for?

Describe a "double flip."

Describe the main wire sub-switchboard.

How are the conductors in a cable connected with the springjacks at the back of the switchboard?

What is the chief feature of the Gardanier universal switchboard.

CHAPTER XXXII.

Trace the connections of a polar duplex.

What pieces of apparatus are placed underneath the table?

How much resistance should the ground coil for duplex apparatus have?

Trace the desk main and local connections of the quadruplex.

How much resistance is allowed for the ground coil of quadruplex apparatus?

CHAPTER XXXIII.

What is a repeater?

What is the simplest form of a repeater?

What is an automatic repeater?

Why are the contact points of the relay not used as the repeating points?

What is the objection to the Wood button repeater?

How are the contact points of repeating instruments kept closed?

How is the transmitter in the Milliken repeater held closed?

How is the relay in the Toye repeater prevented from being demagnetized?

Why does the Toye repeater require no extra magnets?

What is the chief advantage possessed by the Neilson repeater?

What is the object in using high resistance magnets on the repeating sounder of the Neilson repeater?

In what respect does the Weiny-Phillips repeater differ from other repeaters?

Describe the construction of the extra magnet of the Weiny-Phillips repeater.

What is the principal feature of the Atkinson repeater?

Describe the Horton repeater.

What is the distinguishing feature in the construction of the Horton repeater and how does this repeater differ from the Hicks-Milliken repeater?

What are the special features of the Ghegan repeater?

How does this repeater perform its repeating functions?

What is a half-repeater and what are the names given these instruments?

What is a defective loop or side line repeater used for?

What are double loop repeaters?

Describe such a device.

How is the repeating sounder connected?

What means are employed to equalize the lengths of the shunt and loop conductors?

On what class of circuits should double loop repeaters be used?

How are such repeaters set up?

Describe the Wood double-loop repeater as to the instruments used and its operation.

What is the object of inserting extra resistance in the battery tap?

(To be continued.)

Depreciation of Telegraph and Telephone Plant.

In an address delivered recently by Mr. Alonzo Burt before the Wisconsin State Telephone Association, at Madison, Wis., on the subject "What Constitutes a Reasonable Rate of Return," the author gave a very clear explanation of the meaning of "depreciation" as applied to bookkeeping. Although his address related to telephone property, his remarks on depreciation are applicable, as well, to the telegraph, and are given, as follows:

"Pioneers in the development of the telephone had very little to guide them in the way of precedent in building or managing telephone property. They put up poles, strung wires, put in the instruments and gave service. They collected the revenues, made expenditures for such repairs as were necessary to keep the plant operating and figured the balance as profits upon the capital invested.

"This ran along for a time until the plants began to require a very much greater sum for the annual upkeep. New money was raised to repair the properties, but the earning capacity was not materially increased. Dividends were substantially decreased and in some cases were suspended entirely. This situation led the managers to investigate, and investigation resulted in the discovery that some financial provision must be made against the rapid and constant depreciation of telephone properties generally.

"Depreciation is probably the most important item in any system of telephone bookkeeping, and the telephone manager who fails to realize that depreciation and dividends are everywhere very closely related is liable to find himself in serious trouble.

"There is considerable confusion in the minds of managers of telephone properties as to the real meaning of depreciation and in the handling of this account. In too many cases the manager confuses depreciation with current upkeep. The terms "current repair" or "current maintenance" used in telephone accounting have the same meaning and cover the expense of keeping the plant in good working condition other than such replacements as become necessary because of inadequacy, obsolescence, decay or gradual deterioration from natural and usual causes.

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"Depreciation, on the other hand, represents the loss of the value of the plant which, in spite of repairs, is constantly accruing by reason of decay, inadequacy, obsolescence or gradual depreciation from natural and usual causes. To this may be added loss through extraordinary damage resulting from sleet storms, cyclones and fire.

"From the experience of the Bell companies and from investigations by special commissions and engineers not connected with the Bell system it is found that the average life of a well constructed telephone property is approximately twelve years. Some portions of the property last much longer than others, but the average annual rate of depreciation has been dealt with by the Railroad Commission of Wisconsin as being around 8 per cent. The rate of depreciation, however, is controlled largely by the character of the original construction, and the depreciation ratio may, therefore, in instances be greater or less than the average.

"A suit of clothes has often been used to illustrate depreciation and maintenance of telephone property. The suit while new is, of course, serviceable, but after a time it gets out of shape and possibly becomes soiled. It is then sent out to be cleaned and pressed, which is maintenance or upkeep. Later the lining becomes worn and some of the buttons are missing. The suit is again sent out for repairs and for more pressing, which is more maintenance. This process goes on and although everything possible is done to extend the life of the suit there is a constant depreciation or wear taking place that cannot be prevented or replaced by any amount of repairing and in the course of time another suit must be purchased. A suit may also depreciate through changes in styles and with an up-to-date dresser may be discarded before it is worn out.

"Breaks in wire and cable may be repaired promptly and thoroughly and repairs made on switchboard and subscribers' station apparatus. This effort corresponds to cleaning and pressing the suit of clothes, but throughout the telephone plant as with the suit depreciation is taking place that cannot be prevented.

"In addition to this depreciation, changes and improvements in the art of telephony are being made which often necessitate discarding apparatus for obsolescence before it is unserviceable through wear.

"It is impossible to replace the annual depreciation on much of a telephone plant each year. Poles begin to depreciate from the time they are placed in the ground, yet the wear cannot be restored annually, and we must wait until they have become useless or unserviceable, when they must be wholly replaced.

"To provide against depreciation it is essential that a specific appropriation be made for depreciation and that the money representing such appropriation be actually set aside for replacement work. To this depreciation account should be charged the cost of replacing a line of poles worn out through decay. A switchboard that has become worn from long service or obsolete through changes in the art or both, would also be charged to the depreciation account, it being understood that if the new switchboard should be of greater capacity the cost of the added capacity would be charged to the plant account and paid for out of new money and not from the depreciation fund."

Radio-Telegraphy.

Mexican Wireless Station.—The Government of Mexico will establish a wireless telegraph station at Bacochibampo, near Guaymas, to replace the Cabo Haro station, which was destroyed by fire.

Apprehension of Bank Robbers by Wireless.—Two alleged bank robbers escaped from Texas recently on the steamer *Brazos*, bound for New York. The captain of the steamer was informed of the fact by wireless, and on arrival at Key West the men were arrested.

Wireless Telephony.—By the use of a new microphone invented by two Swedes, Carl Egner and J. Kanner, it is possible to hold wireless telephone conversation for a distance of 175 miles.

Seizing a Wireless Station.—A story from Brant Rock, Mass., January 4, was to the effect that a number of men surrounded the wireless telegraph station of Professor Reginald A. Fessenden, preparatory to seizing his books, records and plans. In the absence of Professor Fessenden, Mrs. Fessenden called up her husband's attorney in Boston by wireless telephone for aid. The sheriff at Plymouth was communicated with and went to the scene of disturbance to protect the Fessenden property.

Congressional Wireless Inquiry.—It is stated that demands will be made upon Congress for an investigation of the wireless telegraph situation throughout the United States. Letters are being sent to members asking that the matter be taken up. These letters charge that a conspiracy was set on foot to destroy the United Wireless Telegraph Company because its present officers would not surrender $5,000,000 worth of stock. Formal request will be made for the appointment of a committee in each branch with authority to summon witnesses and inspect the books of all wireless companies.

Mr. John R. Irwin, the wireless operator on the Wellman airship, who for the past two months has been filling a theatrical engagement, has agreed to accompany another Wellman expedition in an attempt to dash across the ocean next July. The airship will be a great improvement over the previous one and very much larger, and the experience obtained through the first attempt to cross the ocean will be very valuable and contribute much toward the success of the next effort. In his theatrical work Mr. Irwin gives practical demonstrations of wireless telegraphy, using the instruments that were employed on the Wellman airship. He also illustrates his topic by means of many lantern slides, showing the airship in detail and other things in connection with the now famous but unsuccessful attempt to cross the Atlantic by the air line route.

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The Railroad.

The Union Pacific Railroad Company has experienced so many cases where its wires have been shot in two by hunters, that it has instructed its train men to keep on the look-out and warn shooters of the danger to the wires. It is thought that the damage is not intentional but results from the hunters shooting at birds perched upon the wires.

Mr. L. W. Landman, the new general passenger agent of the New York Central Lines, was, like the chief official of his company, President W. C. Brown, formerly a telegraph operator. He entered the railroad telegraph service in 1888 as operator on the Bloomington and Western Railway, and has filled important positions on other railroads.

Discharged Operator's Suicide.—Nicholas Honness, an operator discharged from the service of the New York Central Lines, on January 4, at Corning, N. Y., fired four shots at Mr. D. W. Dinan, division superintendent of the railroad company and, thinking that he had killed Mr. Dinan, fired a shot into his own brain from the effects of which he died later. Mr. Dinan will recover.

Mr. E. L. Myers, chief electrician of the National Railways of Mexico, whose appointment to that position was recently mentioned in this column, was born in Toulon, Ill., July 16, 1864. He began his telegraphic career in Los Angeles, Cal., in 1887, and had an extensive experience in line construction for the Western Union Telegraph Company before going to Mexico. Prior to his recent appointment he was gang foreman on the National Railways of Mexico.

Block Signal System.—A patent (No. 979,556) has been issued to G. S. Pflasterer, Nashville, Tenn., on a block signal system. This is a three-position signal with an actuating device for moving the signal from danger to an intermediate position and then to a third position with a manual latch preventing movement of the actuating device to set the signal to the third position and an electric lock for the latch.

Mr. Antonio Jimenez, superintendent of telegraph for the National Railways of Mexico, whose appointment was announced in these columns January 1, is a native of Mexico, having been born in Cuantitlan on March 23, 1875. He entered the telegraph service on that road as operator in July, 1888, and has filled positions as operator, manager, train dispatcher, chief clerk to the superintendent of telegraph and chief dispatcher on the National, Central and Interoceanic Railways.

Determination of Selector Resistances.—The article of Mr. W. E. Harkness on the "Determination of Selector Resistances," in the January 1 issue, has met a very appreciative reception. Several railway telegraph superintendents have written us commenting upon it very favorably, and suggest that everyone identified with railroad operation should read it carefully. The article was a very clear and comprehensive exposition of the subject, and all railway superintendents and others concerned should familiarize themselves with the matter as it is one of vital concern in railway telegraph operation at the present time.

Meetings of Railway Telegraph Superintendents.—The Hotel Brunswick has been selected as the headquarters for the convention of the Association of Railway Telegraph Superintendents to be held in Boston, Mass., June 19 to 23. The rates at this hotel are: $2.00 to $3.00 per day for single room without bath; $2.50 to $4.00 for single room with bath. The meetings will be held in the banquet hall of the hotel and plenty of room will be available for the display of exhibits.

The next meeting of the Western Division of the Association of Railway Telegraph Superintendents will be held at the Southern Hotel, St. Louis, Mo., January 26. At this meeting some suggested changes in the constitution and by-laws of the association will be discussed. Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railway Company, St. Louis, is chairman of the Western Division.

Telephone Train Dispatching on the Lehigh Valley.—A telephone line has just been cut into service between Packerton and Bernice, Pa., on the Lehigh Valley Railroad, the dispatcher being located at Wilkes-Barre. The telegraph will soon be supplanted also between Wilkes-Barre and Sayre, adding about 90 miles more. The new circuit connects with about twenty-five way stations, and is approximately 140 miles long. This train wire is divided into three sections, each radiating from Wilkes-Barre. The signaling equipment is so arranged that when a dispatcher calls any station signaling impulses are sent out over that particular section only. One section, which is known as the Mountain cut-off, has a special arrangement whereby in the event of any trouble on the train wire it is possible to connect it into the main line, thus completing the circuit on either side of the trouble and enabling the dispatcher still to get every station. It is stated that the Lehigh Valley plans eventually to use the telephone exclusively for the work of dispatching trains.

Dispatching on the Baltimore & Ohio.—The Baltimore & Ohio Railroad has just installed a telephone train dispatching equipment, made by the United States Electric Company, of New York, between Grafton and Salem, W. Va. The circuit is 35.8 miles long and there are twelve stations on the line, the dispatcher being located at Grafton. The Gill selector is installed at each of these stations and the signal bell is rung by the main line current, the source of power being at the dispatcher's office. This circuit covers a busy section of single track road and telephone dispatching is expected to expedite train movement over the division.

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The Turner Monument Fund.

Subscriptions toward the Turner Monument Fund are coming in steadily and the total is now approaching the one thousand dollar mark. As the project becomes more widely known greater interest is manifested in it, and it is hoped that the plans will soon be brought to a successful conclusion.

It should be understood that the monument shown in the illustration in the last issue has not been accepted by the committee. Suggestions and plans are invited from anyone who has ideas on the subject.

The following named gentlemen constitute the committee in charge of the Monument Fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds are deposited with the Washington Trust Company, New York, as soon as received.

Since the last acknowledgment of contributions the John A. Roebling's Sons Company has subscribed $50 toward the fund.

For the information of those who may not yet be familiar with the object of this undertaking we may state that it is to commemorate the sending of the first telegraphic train order. This historical event took place at Turner, N. Y., in the autumn of 1851, and the order was sent by Charles Minot, general superintendent of the Erie Railroad. The proposed monument will cost about $3,000, and to meet this expense subscriptions are invited from all railroad and telegraph men. The Association of Railway Telegraph Superintendents and the Old Time Telegraphers' and Historical Association have given the proposition their official endorsement and are heartily co-operating in the work of raising the necessary funds.

The contributions received up to date are as follows: Previously acknowledged, $664.75; Maxwell Green, New York, $1.00; C. Adams-Randall, New York, $1.00; W. B. Holmes, Ravena, N. Y., $1.00; W. A. Sawyer, Philadelphia, Pa., $5.00; Thos. F. Clark, New York, $5.00; E. M. Rine, Scranton, Pa., $1.00; L. B. Foley, New York, $2.50; G. A. Poore, Syracuse, N. Y., $1.00; Geo. E. Hollrook, Wagner, Mont., $1.00; J. Moxam, Detroit, Mich., $1.00; Dr. Alfred Lowther, Detroit, Mich., $1.00; John A. Roebling's Sons Company, New York, $50.00; S. L. Van ,Akin, Jr., Syracuse, N. Y., $2.00; B. K. Van Nortwick, Paterson, N. J., $2.00; S. B. Van Nortwick, Paterson, N. J., $2.00; W. G. Brownson, Toledo, Ohio, $5.00; J. B. Stewart, New York, $5.00; G. H. Corse, Shanghai, China, $5.00; I. T. Dyer, Los Angeles, Cal., $1.00. Total, $757.25.

Reminiscences of Charles Minot.

Mr. W. G. Brownson, of Toledo, Ohio, a well-known old-time telegrapher, a forty-niner of the telegraph, and an ex-railroad official, was associated with Mr. Charles Minot for several years during the time the latter gentleman was general superintendent of the Erie Railroad, beginning in 1851.

For five years Mr. Brownson was agent and operator at Turner, N. Y. Mr. Minot used to call the division superintendents to Turner once a month and hold conferences for the benefit of the service, making the telegraph office their headquarters. The superintendents talked about everything, from track to locomotives, and Mr. Brownson found these conferences an excellent schooling. Great credit is due to Mr. Minot for his foresight in perceiving the advantages of holding conferences, and was probably the first one in the railroad business to undertake such meetings.

Six division superintendents attended these monthly gatherings, and all of them developed into good railroad men. They included Mr. Hugh Riddle, who afterward became president and general manager of the Chicago, Rock Island and Pacific Railway, and Mr. Horatio Brooks, who was the founder of the Brooks locomotive works.

Mr. D. C. McCallum was placed in charge of the railroad, and Mr. M. D. Woodford, afterwards president of the Cincinnati, Hamilton and Dayton Railroad, was the operator at Jersey City. On one occasion Mr. Brownson called on Mr. Woodford and learned that there was a washout on the road between Jersey City and Turner, and as he was passing out of the office he met Mr. Minot, who was going over the road with Mr. McCallum. Mr. Minot invited Mr. Brownson to go along. When they reached Passaic Bridge, they got out and walked to the center of the brige to see if it was safe—the water being high and running swiftly. Mr. McCallum was afraid that it was weak, but Mr. Minot motioned to the engineer to come on and the train crossed the bridge all right. On reaching Ramapo they found the track washed out. There was an engine on the other side of the break, over which the rails and ties were hanging. Mr. McCallum again was in doubt, but Mr. Minot was undaunted.

Mr. Brownson mentions a strike of the engineers on the Erie which, he thinks, was the first strike among that class of employes. The engineers really struck, Mr. Brownson says, because Mr. Minot had left the road. They disliked Mr. McCallum.

Mr. Minot was a bachelor and very fond of young men, and about six months before he left the

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Erie Railroad he invited Mr. Brownson to go to his place in Somerville, near Boston, and become his boy. Mr. Brownson declined because he intended to get married the next year. He, however, suggested that Charles Vail be employed, which Mr. Minot did. When Mr. Minot died he left Mr. Vail the use of $14,000 as long as he lived.

Mr. Minot stayed at Somerville for a short time and then went to the Michigan Southern and Northern Indiana Railway, now part of the Lake Shore system. At the end of a year, however, he returned to the Erie Railroad and remained with it until his death. He was made consulting director, and he died in his chair in the company's offices.

Mr. Brownson expresses his wish for success in the Turner monument project and contributes $5.00 toward the fund.

Obituary.

Frank M. Greene, age 69 years, for many years manager of the Western Union Telegraph Company at Toledo, Ohio, died December 27 of heart disease. Mr. Greene entered the service of the company at Toledo as a clerk in the early seventies, later becoming cashier and finally manager of the office. He retired from active duties five years ago.

Edgar F. Phillips, assistant to Mr. Alexander Dow, vice-president and general manager of the Detroit Edison Company, Detroit, Mich., and a former telegrapher, died in that city December 25, aged sixty-one years. Mr. Phillips was night chief operator in the Detroit Western Union office for several years, and was afterward general manager of the Michigan State Telephone Company.

Caleb L. Pope, aged 69, a veteran telegrapher, died recently at Hull, Mass. He was born in that place July 16, 1841, and was an operator at various points in Massachusetts, including Boston. He retired from active service six years ago, after having been engaged in telegraphy for forty-five years.

Roy H. Miller, an operator for the National Packing Company, in New York, died December 23 after a two-weeks' illness. He was born in Ohio November 1, 1855, and was employed at different times at various places throughout the country by the Western Union Telegraph Company, the Postal Telegraph-Cable Company and the Associated Press. He was for seventeen years with the Postal Company at Savannah, Ga. On January 1, 1904, he came to New York to accept a position with the National Packing Company in its telegraph department which he occupied until he became ill. His remains were buried at Millheim, Pa. Mr. Miller is one of three brothers who have devoted their business careers to the telegraph service.

Sidney Brooks Curtis, for forty years cashier of the Hartford office of the Western Union Telegraph Company, died in that city, December 11, of pleuro-pneumonia. He was in his seventy-first year, and had been in the company's service for fifty years. A few days prior to his death Mr. Curtis was in New York and called upon many of his old firiends.

Henry Guy Carleton, of New York, the playwriter, an old-time telegrapher, author, also soldier and inventor, died at Hot Springs, Ark., on December 10, aged 65.

The Robert W. Martin Fund.

A high official of one of the large telegraph companies in contributing toward the fund for the relief of Mr. Robert W. Martin, writes as follows: "I take pleasure in enclosing herewith a check for $10 for the relief of Robert W. Martin." Mr. Martin, who is a well-known old time telegrapher, is suffering from a stroke of paralysis and has been confined to his bed for several years as a consequence. In his helpless condition he has been unable to do any work, and his friends have very generously helped him and his family along in their need. Contributions are acknowledged in these columns and turned over to Mrs. Martin as they are received.

Attention is called to the advertisement of the Central Typewriter Exchange of New York which appears on another page of this issue.

The "Exchange" was established in 1896 and is therefore one of the oldest in the city.

Their specialty is the sale of factory-rebuilt typewriters. Mr. D. A. Mahoney, who for the past 20 years has had extensive dealings in placing "mills" with telegraphers has been placed in charge, and we can assure our readers that they may be confident of being accorded fair treatment and are requested to write Mr. Mahoney direct if they desire a rebuilt machine or wish their old one put in first-class order.

Duplex Transmitter. — The "Dunduplex," handled by Thomas J. Dunn & Co., 1 Broadway, New York, enables an operator to transmit clean-cut dots at any rate of speed, and greatly relieves the nerve strain. The vibrating frame is operated by a plunger, which successfully checks the wig-wagging of the vibrating arm and prevents the splitting of dots and other mutilation of characters. It produces a firm solid contact at the points, irrespective of the force used in the operation of the lever. It's mechanical construction is solid and it is designed on correct principles.

LETTERS FROM OUR AGENTS.

Los Angeles, Postal.

The promotion of Mr. V. V. Stevenson, manager of this office, to be electrical engineer on the Pacific Coast at San Francisco, to succeed Mr. H. C. Shaw, transferred to Chicago, as noted in a previous issue, has occasioned other changes as follows: Mr. J. H. Dorsey becomes manager of the Los Angeles office; A. B. Fountain, all night chief; Walter Ogden, night chief; C. E. Page, assistant day chief.

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PITTSBURG, WESTERN UNION:

The following service changes in this office became effective January 4: Mr. F. E. Schiller, plant chief; Mr. D. F. Driscol, wire chief; Messrs. S. B. Harte, Jr., J. R. Palmer, D. D. Calvert and William Fox, assistant wire chiefs; Mr. D. Kelly, repeater chief; Messrs. Wm. H. Maize, B. I. Gable, W. J. Gilson, J. E. Palmer, W. W. Creahn, I. H. Weaver, E. Fisher, W. L. Lentz, and D. V. Lawell, assistant repeater chiefs.

NEW YORK, WESTERN UNION.

Andrew A. Offutt, aged fifty-six, an operator in the general operating department of this company for over thirty years, died on January 5 after an illness of two weeks. The funeral services were held January 9 and were attended by a large number of friends and a delegation from the New York Telegraphers' Aid Society, who served as honorary pallbearers. Mr. Offutt had been an active member of this society since 1881, just one year after its organization. The remains were buried in St. Michael's Cemetery, Jersey City, N. J. Mr. Offutt's death came as a great shock to a large circle of friends, who held him in high esteem.

Peter Westervelt, for many years connected with the Gold and Stock Telegraph Company, New York, died in Brooklyn January 5. He was seventy years old.

New York Telegraphers' Aid Society.—The financial statement of the New York Telegraphers' Aid Society for the quarter ended December 6 shows the following results: Balance on hand September 6, $24,487.01; receipts, $1,770.50; disbursements, $1,220.50; leaving a balance of $25,037.01. The relief fund was increased $427.57 during the same period.

Impregnating Apparatus Wanted.—Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 o'clock a. m., January 24, to furnish at the navy yard, Norfolk, Va., a vacuum drying and impregnating apparatus. Applications for proposals should designate the schedule number 3248. Blank proposals will be furnished upon application to the navy pay office, Norfolk, Va., or to the Bureau. T. J. Cowie, Paymaster-General, U. S. N.

NEW YORK, POSTAL.

Mr. W. J. Parrall, service clerk in the main operating room, died December 18.

It is a pleasure for me to sell a CENTRAL rebuilt. Write me personally. D. A. Mahoney, 203 Broadway, New York.

Central Typewriter Exchange, 203 Broadway, New York. The best factory-rebuilts to be found anywhere. Postal employes may own their mills; seventy-five cents weekly. Correspondence invited. D. A. Mahoney, Representative.

Life Insurance is based upon the certainty of death at some time and its possibility at any time. The splendid financial position of the Telegraphers' Mutual Benefit Association, 195 Broadway, New York, is shown in the Reserve Fund, of $317,000, which, apart from current assets, amounts to nearly 6 1-3% of the total contingent mortuary liabilities, and yields an annual revenue of more than $15,000; operating on sound and correct principles, with ample security, it offers to the telegraph and telephone employe the best and most economical form of protection for the family and dependents yet devised. Write for particulars.

Serial Building Loan and Savings Institution.—The report of the Serial Building Loan and Savings Institution, 195 Broadway, New York, shows that the year 1910 was the most successful in the history of the institution. This is the best of evidence that it is doing good work. It has assisted over a thousand telegraphers to save money and buy homes. This is what it is in existence for. Each member is also a shareholder and participates in the profits of the business. Those who are not familiar with the plan of operations would do well to look into the matter and become interested. The secretary will be glad to give all the particulars desired.

American Telegraphy and Encyclopedia of the Telegraph

By WILLIAM MAVER, JR.

668 Pages, 490 Diagrams, $5.00.

To facilitate the purchase of this valuable work on telegraph engineering and electricity and magnetism, the publishers will forward the book to responsible telegraphists and telephonists on receipt of order for same as follows:

"Please send me one copy of 'American Telegraphy and Encyclopedia of the Telegraph,' for which I agree to pay $5.00; namely $1.00 (plus 25c. postage) herewith and $1.00 monthly for four months.

"Reference Signature and Address."

Special discounts to agents. Write for terms.

Address

Maver Publishing Co., 136 Liberty St., New York

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

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.

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Telegraph and Telephone Age

No. 3. NEW YORK, FEBRUARY 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY—XI.

A Study of Electrical Apparatus.

BY WILLIS H. JONES.

GENERATOR EFFICIENCY.

Students frequently confound the words efficiency and capacity when referring to the output of some electrical machine on account of the too common misunderstanding of those terms.

If we were to speak of a man's ability to accomplish some particular piece of work we might say that he possessed the capacity to do it, but if we referred to the electrical output of, say, a generator there is quite a distinction between the meaning of the two words.

In electrical parlance the term efficiency refers properly to the percentage of useful electrical energy a generator delivers as compared with the mechanical energy expended in running the machine. Thus if a generator requires ten mechanical horsepower to run it and could only deliver five electrical horsepower its efficiency would be rated at fifty per cent, while a seven and one-half horsepower output would indicate a seventy-five per cent efficiency.

The capacity of a generator refers to the maximum current it is capable of delivering with safety without undue heating.

In constructing a generator for any given output there are many things to consider. The first point to realize is that the larger the machine is the greater will be its efficiency, other things being equal. The explanation is that large diameter copper conductors on large armatures have less resistance than have smaller sizes and therefore can add no appreciable resistance to the external circuit with which they may be connected when supplying current.

In like manner large masses of iron in the armature and in the magnet cores and polepieces decrease the reluctance of the magnetic circuit, thus facilitating the generation of a stronger magnetic field than could be obtained from the same expenditure of energy in smaller masses.

For example, if the armature core is small the wire used in winding it must likewise be small in diameter in order that the various slots when filled to the prescribed limit will possess a sufficient number of turns to generate the necessary voltage.

If the E. M. F. (voltage), is high in a small machine you may safely conclude that its current output is correspondingly small, for the reason that small conductors possess considerable resistance and cannot carry a very great volume of current without becoming overheated.

It also follows that owing to the high internal resistance of such machines they consume quite a large percentage of their own energy, hence in overcoming this resistance their efficiency is low.

In order to obtain a greater output therefore it is obvious that the method to follow is to use larger conductors in the windings. The output will then be greater because of diminished internal losses, although the E. M. F. across the brushes of a small and of a large machine may be the same.

Nor are the dimensions of a machine all that determine its efficiency. Much depends upon the material, design and workmanship. Yet even with perfection in these particulars there will still remain certain small unavoidable losses in the form of useless electrical currents developed in the coils and iron which consume a portion of the energy generated by the machine.

For instance, when a mass of iron is magnetized and demagnetized rapidly, a rearrangement of its molecules takes place at each alternation. The resulting friction between them generates heat in the mass, which is a useless waste of energy. This action is known as hysteresis.

In well constructed direct current machines losses due to this cause are comparatively small, but in alternating current generators it becomes quite large owing to the fact that the relative positions of the molecules are changed with each alternation of the magnetizing current. In high frequency alternators, therefore, the molecular friction may be great, resulting in the development of much heat in the magnetic circuits.

Again, when the magnetism in a mass of iron is denser at one point than at another a difference of

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potential will arise and a current of electricity will flow through a wire laying between the points. Sharp corners and edges in the iron parts are detrimental because they contribute to this effect. Currents of this kind are called eddy currents. Eddy currents may be minimized by using laminated cores for the armature and magnets, as such cores offer a high ohmic resistance to these currents.

The student should now understand and appreciate the fact that the efficiency of generators increases generally in inverse proportion to the reduction of the losses referred to.

Messenger Call System.

BY JOHN F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The accompanying diagram shows the Postal Telegraph-Cable Company's standard method of connecting up a messenger call system at small stations where gravity battery is used to supply current to the circuit. Normally the lever of the three-point switch shown at the right of the lower relay stands in the centre and under the conditions thus shown the circuit is metallic throughout. If a ground should appear on the circuit it may be detected by the action of the relay when the switch lever is thrown to the right or left, as placing the lever on these contacts tends to cut the relay out of circuit when there is a ground on the line.

In the event of a break where the circuit is opened on one side and grounded on the other, the switch lever is thrown so that the battery will supply current from the office ground through the relay to the ground on the circuit. If the connections are traced it will be seen that with the switch in one position, current is supplied by the battery with one side of the circuit open and the other grounded, and with the switch in the other position the conditions are reversed; i. e., with the other sides of the line open and grounded respectively.

Several fuse blocks are arranged at convenient places in the circuit for temporarily grounding the line in case it should open in both directions. Dry battery cells are used to operate the call bell and register.

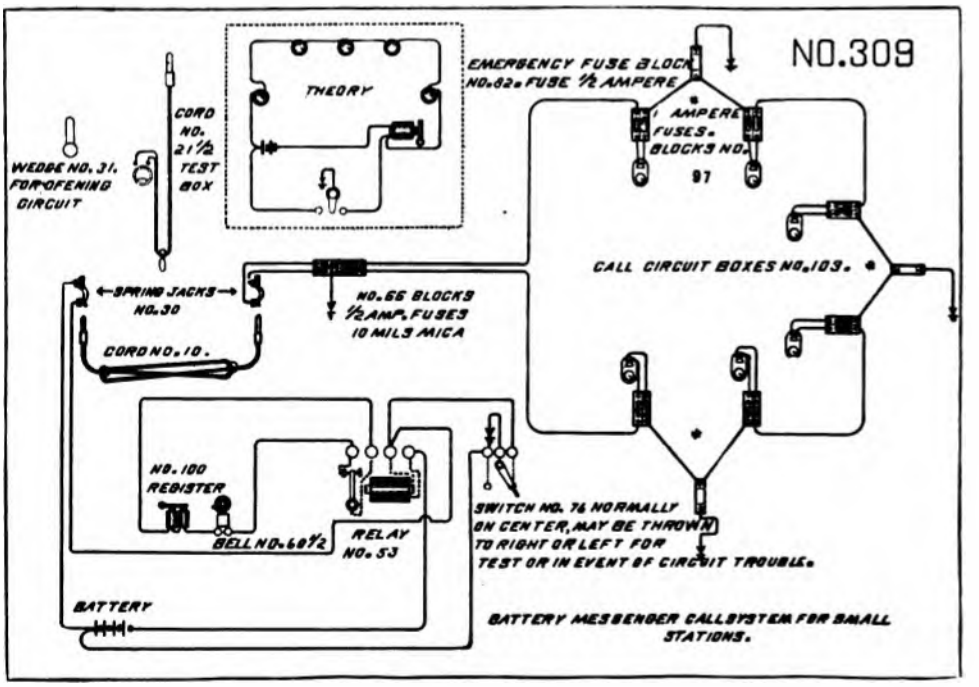

DIAGRAM OF MESSENGER CALL SYSTEM.

Recent Telegraph and Telephone Patents.

ISSUED JANUARY 3.

980,256. Village Telephone Police Call. To G. W. Herrick, St. Marys, Pa.

980,356. 980,357. 980,358 and 980,359. Multiplex Telephony and Telegraphy. To G. O. Squier, United States Army.

980,417. Automatic Exchange Selector. To H. B. Holmes, Park Ridge, and E. B. Craft, Chicago, Ill.

980,465. Automatic Adjustable Holder for Telephone Instruments. To F. S. Weyrs, Philadelphia, Pa.

980,613. Telephone System. To W. W. Dean, Elyria, Ohio.

980,619. Locking device for the Receiving Arms of Telephones. To W. R. Ewing, Mars, and Charles P. Ewing, Renfrew, Pa.

980,830. Battery and Holder. To G. L. Patterson, New York, N. Y.

980,857. Party Line Telephone Exchange. To C. A. Anderson, Salina, Kan.

980,883. Telephone Exchange. To N. E. Norstrom, Chicago, Ill.

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980,884. Lightning Arrester. To N. E. Norstrom, Chicago, Ill.

980,885. Cable Box. To N. E. Norstrom, Chicago, Ill.

980,886. Telephone Exchange. To S. A. Norstrom, Chicago, Ill.

ISSUED JANUARY 10.

981,120. Telephone and Telegraph System. To H. O. Rugh, Sandwich, Ill.

981,399. Telephone Trunking System. To A. H. Dyson, Chicago, Ill.

981,406. Multiplex Telegraphy. To R. A. Fessenden, Washington, D. C.

The following patents have expired:

No. 510,209. Electric Telegraphy. Issued to Charles Thom, Jr., Brooklyn, N. Y.

No. 510,430. Telegraph or Telephone System. Issued to Wallace R. Kirk, Kansas City, Mo.

No. 510,457. Electric Call System. Issued to Samuel Whitehall, South Bend, Ind., and E. W. Whitehall, Attica, Ind.

No. 510,508. Simultaneous Telegraphy and Telephony. Issued to Silas W. Holman, Boston, Mass.

No. 510,535. Telephone Toll Apparatus. Issued to Wm. Gray, Hartford, Conn.

No. 510,612. System of Telegraphy. Issued to Charles J. Reed, Orange, N. J.

No. 510,863. Telephone Exchange System. Issued to Wm. W. Jacques, Newton, Mass.

Personal.

Mr. Angus S. Hibbard, vice-president and general manager of the Chicago Telephone Company, has been elected president of the Wisconsin Society of Chicago.

Mr. Agustin Sal has been appointed general manager of government telegraphs of Argentina with headquarters at Buenos Aires. Mr. Sal has had a wide experience in the telegraph service of the Argentine Republic.

Mr. H. D. Twombly, vice-president and treasurer of the Wm. E. Reynolds Company, Omaha, Neb., was a recent New York visitor on business. This company manufactures the Reynolds relay telegraph sounder attachment.

Mr. Charles C. Walker, assistant general manager of the Chesapeake and Ohio Railroad, was formerly a telegraph operator and has occupied many important positions since then on that road. He is a native of Virginia, being born June 21, 1858.

Mr. Thomas A. Edison has been elected an honorary member of the Engineer's Club of New York. The club has now four honorary members, including Mr. Andrew Carnegie, Rear-Admiral George W. Melville of the United States Navy and Mr. John Fritz, the pioneer of the steel and iron industry in America, besides Mr. Edison. The official letter of the club to Mr. Edison refers to his achievements as an inventor and his great contributions to engineering and industry.

Mr. W. H. Hurst, president of the Stock Quotation Telegraph Company, New York, accompanied by Mrs. Hurst, will sail for Europe in April on business connected with the service.

Mr. James R. Mayer has been appointed superintendent of telegraph and telephone of the Texas Company with headquarters at Houston, Texas. This oil company's wire system embraces the states of Kansas, Oklahoma, Texas and Louisiana. Mr. Mayer is a native of East Liverpool, Ohio, and has had a long and successful experience in telegraphy, and is well fitted for the duties of his new position.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice president and general manager, accompanied by Mr. W. I. Capen, general superintendent of plant, and Mr. Lewis MacConnach, secretary to Mr. Nally, left on January 22 on an extended business trip through the Western and Pacific Coast states.

Mr. E. B. Pillsbury, general superintendent of the Eastern Division, was a delegate in the interest of the Merchants' Association of New York at the National Tariff Convention recently held in Washington. Mr. Pillsbury, with his associates, attended a special reception given to them by President Taft, and was also present at the banquet, given in honor of the delegates.

Mr. F. H. Hollenbeck has been appointed chief clerk in the office of Vice-President Charles C. Adams, to succeed Mr. W. H. Matthews, resigned.

The main office of this company, at Rochester, N. Y., has been enlarged and rearranged to meet the demands of the increased business.

Mr. H. G. McGill, superintendent of the first district, Western Division, Chicago, was presented with a handsome scarf pin and monogram cuff-buttons by the managers of the first district upon his assuming charge of the district comprising the main and branch offices in Chicago. This token of their esteem was all the more sincere because the managers seemed to act as of one accord in their desire to express their appreciation of Mr. McGill's worth as a man and a superior official.

Mr. Philip L. Lee, whose appointment as manager of the Milwaukee, Wis., office of this company, was noted in these columns January 16, was born in Milwaukee in 1877 and entered the telegraph service in that city July 1, 1901, as delivery clerk. He afterwards became chief clerk, and, later, cashier, from which latter position he was promoted to be manager of the office.

Mr. Wm. O'Connell, of Pittsfield, Mass., has been appointed manager of the North Adams, Mass., office, vice W. F. Orr, resigned.

Postal Company's New Tariff Book.—The new tariff book of the Postal Telegraph-Cable Company, just issued, contains 834 pages, which is an increase of 60 pages over the previous book. On the four

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margins of the front cover is a list of cities and towns throughout the world, together with the standard time at each compared with New York time. On the outside back cover is a table of tolls for night lettergrams containing fifty words (or less) to 250 words. Following the tariff section of the book is a group of green pages giving general instructions as to the money transfer service. These are followed by pink sheets, containing rules, rates and instructions regarding cablegrams, and the last section, on yellow pages, consists of Book of Rules for Postal Service. The book represents a vast amount of labor, and reflects great credit upon Mr. Isaac Smith, superintendent of tariffs, New York, under whose immediate direction it was produced.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager of this company, who has been on a tour of inspection through the Southern states east of the Mississippi, has returned to his office. He was accompanied on his trip by Mr. Thomas W. Carroll, assistant to the general manager, Mr. S. B. Haig, of the office of the traffic engineer, New York, and his secretary, Mr. W. C. Merly. The party visited the principal Southern cities where they conferred with the local, district and division officials on matters pertaining to the further expansion of the service.

Mr. Rush Taggart has been appointed general counsel of this company, vice Judge J. F. Dillon, who has been appointed consulting counsel.

Mr. P. G. Kern, superintendent of the Southern Division of the American District Telegraph Company of New Jersey, with headquarters at Louisville, Ky., was a recent New York visitor on company business.

Mr. W. H. Mathews, of the executive offices of the Postal Telegraph-Cable Company, New York, has accepted a position in the complaint service department, Eastern Division of this company, with headquarters in New York.

An arrangement has been made whereby telephone subscribers in small places where the telegraph office is open only part time, may file their telegrams by telephone at the nearest open Western Union office at the same cost as though the telegram was dispatched direct from the home town. No charge will be made against the subscriber for the use of the long dtasince telephone service in such cases. This service goes into effect February 1.

Certain telephone pay stations throughout the country have been designated to receive telegrams from the public as though they were actual telegraph stations. The attendant at such stations will represent the telegraph company, and transact the telegraph business with the public in the usual way. Hereafter the American Telephone and Telegraph Company will collect the charges for telegrams sent by subscribers to telegraph offices over the telephone.

Telephoning Telegrams.—A few days ago it was stated in the newspapers that the telegraph companies had decided to either abolish or modify the practice of telephoning telegrams to their destination because of alleged trouble that had arisen on account of some messages having thus fallen into improper hands. This report on investigation appears to have no foundation in fact. Commenting on the matter editorially, a New York daily paper states: "This proposal is foolish, reactionary and unworthy of a sensible man. * * * Let it be understood that those who thus send telegrams over the telephone wire do so at their own risk, and are willing to abide by that risk. The combination of telegraph and telephone is a great public service. * * * But this combination is in line with the great work of organization, of concentration, and of simplifying, and it must go on."

Mr. H. D. Austin, district traffic chief of the American Telephone and Telegraph Company at Reading, Pa., has resigned to become district traffic supervisor, fourth district, with headquarters at Philadelphia.

Mr. C. E. Davidson, manager of the Tampa, Fla., office has been promoted to the management of the Jacksonville, Fla., office.

Mrs. H. O. Bannister, wife of Mr. H. O. Bannister, manager of the Western Union Telegraph office at Raleigh, N. C., and their seventeen months old son, were asphyxiated by escaping gas at their home in that place on January 6. A gas heater in the bath room had become deranged, and it is thought that Mrs. Bannister became faint from the smell of the escaping gas and fell with her child. In their helpless condition they were both suffocated by the gas. Mrs. Bannister was formerly a telegraph operator and was twenty-two years of age. The remains were taken to Richmond for burial. Mr. Bannister has the sympathy of a large circle of friends in his great bereavement.

Reciprocity Agreement with Canada.—The reciprocity agreement between the United States and Canada, which is now before Congress, provides for the placing of telegraph and telephone poles upon the free list. Other articles used in the electrical industries and included in the free list are, mica (unmanufactured), carbon electrodes, and galvanized iron or steel wire.

Overcoming Gravitation.—Mr. Emile Bachelet, of Mount Vernon, N. Y., claims to have discovered a means of overcoming gravitation by electricity. According to a local paper the electric machine acts upon metals in such a manner as to keep them suspended in air. From the description the effects seem to be similar to those obtained by Prof. Elihu Thomson some years ago in his experiments with the repulsive action of alternating currents.

Telegraph and Telephone Age is the leading publication in its field. Subscription price, $2.00 per year.

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B. P. Hancock Becomes Western Union Traffic Superintendent at Jacksonville, Fla.

Mr. B. P. Hancock, formerly district supervisor of the Western Union Telegraph Company, with headquarters at Atlanta, Ga., has been appointed district traffic superintendent at Jacksonville, Fla., vice J. E. Peacock, resigned. Mr. Hancock was born at Centreville, Ala., April 20, 1868, and began his telegraphic career in 1881 at Corpus Christi, Texas. In 1883 he obtained a position as operator on the Mexican National Railroad, but returned to the "States" two years later, entering the Commercial service at Galves-

B. P. HANCOCK,
Superintendent of Traffic, Western Union Telegraph Company, Jacksonville, Fla.

ton, Tex. In 1891 he was appointed manager of the Postal Telegraph-Cable Company's office at Chattanooga, Tenn., and three months later was transferred to the Nashville office. He was out of the service for four years after this on account of ill health, but re-entered the Postal Company's employ as chief operator at Memphis, Tenn., in May, 1897, since which time he has filled a similar position in St. Louis, and that of traffic chief operator at Chicago. Later he was promoted to be city superintendent for that company in Chicago. He was afterwards engaged in the electrical business in New York, and four years ago returned to the Postal's service at Birmingham, Ala., where he remained until he entered the Western Union office at Atlanta last November.

Mr. William F. Orr, of North Adams, Mass., Becomes District Commercial Manager.

Mr. William F. Orr, district commercial manager of the Western Union Telegraph Company, with headquarters at North Adams, Mass., has been placed in charge of the state of Vermont and western Massachusetts. Mr. Orr was born in North Adams, and entered the telegraph service at the age of fourteen years with the Western Union Company. He was appointed manager of the Western Union office at North Adams in 1880, and in 1886 resigned to go into the brokerage business. Upon the organization of the Commercial Union Telegraph Company, Mr. Orr was appointed superintendent of the Central District, acting in that capacity until January, 1892, when the lines of that company were leased by the Postal Telegraph-Cable Company. He remained

W. F. ORR,
District Commercial Manager, North Adams, Mass.

as manager of the North Adams office until his acceptance of his present position. Mr. Orr started the first telephone exchange there, which was afterwards sold to the New England Telephone and Telegraph Company. Mr. Orr's experience in telegraph matters admirably equips him for the duties he is now taking up.

Arthur R. McGrath, Special Agent Western Union Telegraph Company, Chicago.

Mr. Arthur R. McGrath, whose appointment as special agent for the Western Union Tele-

A. R. McGRATH,
Special Agent, Western Union Telegraph Company, Chicago.

graph Company at Chicago was announced in the January 1 issue, was born in Chicago, August 4, 1879. He entered the telegraph ser-

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vice as messenger in the Western Union Telegraph office at Cleveland, Ohio, in 1890, and later in the year went with the Postal Telegraph-Cable Company and worked his way up to the position of chief clerk. On January 1, 1904, he was transferred to Chicago to occupy a like position and on June 1, 1908, was appointed office manager. A year later he was promoted to the assistant managership which position he held at the time of his recent appointment.

Mr. Charles E. Davidson, manager of the Western Union Telegraph office at Jacksonville, Fla., was born at Waresboro, Ga., October 7, 1877, and entered the telegraph service at Brunswick, Ga., in June, 1894, as operator. He filled this position for five years and for six years afterward was manager of the office. He then went to Jacksonville, first as traffic chief and afterward as operator, and later accepted the managership of the Tampa, Fla., office. He remained in Tampa for two and a half years, and on November 10, 1910, was transferred to Jacksonville as manager.

Canadian Notes.

Mr. J. Townsley, former superintendent of construction at Montreal for the Canadian Pacific Railway Company, was presented with a fur-lined coat by the linemen of the Eastern Division of that railroad on the occasion of his retirement on January 1. Mr. Townsley was also presented with a gold headed ebony cane by the superintendents, inspectors and other officials of the construction department, from Vancouver to St. John. He has been in the service of the company since 1882, and, having completed his allotted period of service, has retired. He is 69 years of age.

Message Forms in Canada.—The Board of Railway Commissioners for Canada has approved, for four months, the forms of contract used in transmitting and receiving messages by the Canadian Pacific Railway Company's Telegraph, the Great North Western Telegraph Company of Canada, the Canadian Northern Telegraph Company, the North American Telegraph Company, the Western Union Telegraph Company, the Anglo-American Telegraph Company, the White Pass and Yukon Route, the Marconi Wireless Telegraph Company, and the Grand Trunk Pacific Telegraph Company.

Annual Meeting of Montreal Telegraph Company.—The Montreal Telegraph Company held its annual meeting in Montreal, January 12. The balance sheet shows assets of $2,293,387. Dividends of $160,000 were paid during the year. A bonus of $5,000 was paid in October. There were no changes in the board of directors. Mr. Hugh A. Allan was re-elected president and Mr. D. Ross Ross, secretary and treasurer.

The Cable.

Lower Cable Rates for Canada.—In response to a question by a member of the Canadian House of Commons, the government stated that "negotiations have been going on for some time and are still going on with a view to reducing the tolls on cablegrams. A conference of the Atlantic cable companies with the British postmaster-general has just taken place with that object in view. It is expected that an announcement will be made shortly in England on the results of that conference."

German Cable to Brazil.—The cable steamer *Stephan* is engaged in laying the last stretch of the new submarine cable of the German-South American Cable Company, which will connect Germany and Brazil. The portion of the cable now being laid is between Monrovia, Liberia, and Pernambuco, Brazil. It is expected that the line will be ready for public business at the end of March.

Diploma for Central and South American Telegraph Company.—A diploma of honor has been awarded to the Central and South American Telegraph Company by the Buenos Aires International Exposition of Railways and Land Transport.

Municipal Electricians.

Fire Alarm.—A patent (No. 981,020) has been granted to F. D. Smenner, Fort Wayne, Ind., for a fire alarm.

Mercury-Arc Rectifier for Charging Fire Alarm Storage Batteries.

A mercury-arc rectifier has been installed for charging the storage batteries which operate the fire-alarm system of Sandusky, Ohio. The battery consists of four sets of fifteen cells each, chloride accumulator, and, with the present system, fifty fire-alarm boxes can be pulled at once.

Previous to the installation of the rectifier a gravity battery consisting of 108 cells operated the fire-alarm system. The new installation, it is stated, effects a saving of $300 per year, as cell renewals when gravity batteries were used were a large item of expense. The first cost of the new equipment, including rectifier, battery and distributing board installed complete, was $589, while the cost of energy for its operation is about $1.40 per month at a ten-cent-per kw-hour rate. It is stated that this equipment is operating very satisfactorily and during the six months it has been in operation no trouble of any kind has been experienced with it.

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Gano Dunn, a Former Telegrapher, Chief Engineer of a Large Electric Manufacturing Company.

Mr. Gano Dunn, chief engineer, vice-president and a director of the Crocker-Wheeler Company, Ampere, N. J., was formerly a telegrapher, and has the distinction of being the first student to receive the degree of Electrical Engineer from Columbia University. Mr. Dunn was born in New York City, October 18, 1870. He learned telegraphy in the signal offices of the New York Central tunnel in New York, and in 1885 obtained his first position as operator at a summer hotel in Catskill, N. Y. He filled this position six summers. During the intervening winters from 1885 to 1891 he worked in various Western Union branch offices at night, in the day time attending the City College, from which he was graduated in 1889. He graduated from Columbia University in 1891.

Mr. Dunn designed and installed the generators in the Western Union New Haven, Conn., office to

Photo by the Misses Selby, N. Y.

GANO DUNN,
Former Telegrapher, now a prominent Electrical Engineer.

take the place of batteries, and assisted Mr. Francis W. Jones, formerly electrical engineer of the Postal Telegraph-Cable Company, in designing and installing the plant in the Postal building at 253 Broadway, New York. He has designed a number of telegraph generating stations and special kinds of motor-generators for use as intermediate batteries, quadruplex batteries, etc.

Mr. Dunn still has a love for telegraphy. His name has been proposed as a candidate for the presidency of the American Institute of Electrical Engineers for the coming year. He takes an active interest in the Institute's affairs, and is one of its foremost members. He was honored by being elected president of the New York Electrical Society for two successive terms, and has occupied prominent positions in committee work of many scientific bodies. Mr. Dunn has traveled extensively and has a wide grasp of electrical matters in European countries as well as in the United States.

Military Telegrapher in the Civil War.

PART LIII.

Among the telegraphers who, during the civil war, took an important part in connection with the telegraph service on both the United States Military and commercial lines was Mr. James A. Swift, who was connected with the signal service for some years, being a lieutenant in the Signal Corps, United States Army, at the time of his death many years ago. Mr. Swift learned telegraphy in 1860, at Magnolia, Md., and at the age of thirteen was placed in charge of that office. Writing of his war experiences, Mr. Swift says in part:

"In those days telegraphy was what you might call in its infancy, but when hostilities began between the North and South, my station became an important one on account of the numerous troop trains passing over the road, nearly all of which made that station the stopping point for the receipt of telegraphic orders. Extra trains loaded with troops hurrying off to the seat of war became so frequent that it necessitated the operator remaining almost constantly at his post.

"Notwithstanding the hard work everything went smoothly until April 21, 1861, when at about ten o'clock at night, the circuit south failed, thus cutting off all communication with Baltimore. I stood by my instrument, adjusting every few minutes in hope of detecting some signs of working, but alas! the familiar "click" did not come. Everything was as silent as the grave, and thus remained until the arrival of the south-bound mail train at three o'clock in the morning. The conductor, Tom Slater having received orders from the superintendent to stop at all telegraph stations and wake up the operators and ascertain the cause of the wire trouble, came rushing into the office and inquired: 'Where is the operator?' 'Here,' was my answer. 'Is your key open?' 'No.' 'Is your ground wire on?' 'No.' 'Then what in the d——l is the matter with the line?' 'Dead open south and has been since ten o'clock,' I said. Turning to the engineer, he said, 'Go ahead to the next telegraph station,' and the train moved on.

"I remained at my instrument, watching faithfully until the dawn of day, yet no signs of 'circuit.' At eight a. m. a train was seen approaching from around the Gunpowder curve, evidently from Baltimore. The engine was running backward and pulling the train after it. It was soon noticed that this engine was the same one that went down with the night mail at three a. m. The train pulled up and stopped at the station and out jumped a number of the Baltimore City police force, also a military company in command of Major I. R. Trimble. I was at my instrument reporting matters to the superintendent, when I was suddenly informed that I was a prisoner. I was placed aboard the train, carried to Bush River and held until the bridge at that point was destroyed. On getting aboard the train, I found my old friend and companion, W. J. Dealy, also a prisoner, having been captured at Back River, at

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which place he had been stationed. From him it was learned that the wire had been cut in many places and all the railroad bridges destroyed. The train which had passed to the South, at three a. m. had been boarded at the city limits in Baltimore by the policemen and the military company, and the engineer with cocked revolvers at his head was compelled to run his train back as far as Bush River in order that all bridges between there and Baltimore might be destroyed. After burning the bridges and destroying the telegraph line in various places, Mr. Dealy and I were liberated.

"Perryville, a station about forty miles from Baltimore, then became the terminus of the Philadelphia, Wilmington and Baltimore Railroad, owing to the destruction of the bridges and was held by a large body of Federal troops. There was no way of reaching the place, however, other than by foot. This course was determined on and we started on our journey and after a weary tramp we reached our destination. Mr. Dealy was placed on duty at the headquarters of Colonel Charles P. Dare, commanding, and I was sent on to Philadelphia. The stay at Perryville lasted about one month, when I received orders to return to my old station. Owing to the fact that the bridges had not yet been rebuilt, no trains were running, and the return trip had to be made on foot, the distance being seventeen miles. The journey was begun at nine a. m. and at four p. m. the station was reached, and telegraphic communication reopened to Baltimore.

"In May, 1862, I accepted a position at the Baltimore and Ohio Railroad depot in Washington City, being in the employ of both the railroad company and the United States Military Telegraph department under superintendent Westbrook of the railroad company and Major Thomas T. Eckert of the military telegraph department. The business consisted of government, commercial and railroad messages, and was very heavy, especially that of the railroad company, which resulted from the running of numerous extra trains hurrying troops from point to point during the raids of General Stonewall Jackson and the battles of South Mountain and Antietam. I served a year there.

"On July 10, 1864, communication with Washington City being entirely cut off by the Confederates, who were in sight of the city, operators were needed by Major Eckert of the United States Military Telegraph Corps to open communication between the War Department and the fortifications, at the most important points around Washington. I was among those who offered their services and was directed to report to the commanding officer, General A. McD. McCook. Being provided with a horse, all haste was made to reach the fort. Just as I was about reporting to the general, an orderly, who was a little ahead, was heard to remark: 'General, they are advancing on our right, and we are out of ammunition,' and a few minutes later a soldier was seen to suddenly throw up his hands and fall, being shot by one of the enemy's sharpshooters. Stray bullets could now occasionally be heard buzzing overhead.

"After reporting to General McCook I was directed to open telegraphic communication with the military headquarters in Washington immediately. This was rather difficult to accomplish, there being no wire yet erected. However, no time was lost. A suitable location for an office was found, and the wire wagon was seen approaching within about two miles of the fort, accompanied by operators J. H. Dwight and T. N. Loucke of the Military Telegraph Service. The work of running out the wire was soon finished and the fort put in telegraphic communication with the War Department. Things remained quiet, with the exception of the killing, or wounding, now and then of some of the pickets, until the evening of July 12, when a portion of the Sixth Army Corps arrived from the Army of the Potomac, and attacked the enemy. A severe fight ensued, lasting from four o'clock in the afternoon until late at night, resulting in the retreat of the Confederates.

"The Confederates having retreated, the office at Fort Stevens was abandoned a day or two after and the operators withdrawn. I returned to the American Telegraph Company in Washington, going with the Western Union Telegraph Company when these two companies were consolidated."

Reference Files.

The importance of keeping a record of articles published pertaining to the line of business one is engaged in cannot be too strongly emphasized, if it is desired to keep informed as to what progress is being made. There is no general rule for doing this, excepting that the classification principle be observed. The details are largely a matter of individual preference, but whichever way the work is done it requires a little labor and time. These, however, are well expended when we consider the results.

One of our subscribers, an official of one of the telegraph companies, informs us that for the past ten years he has kept a clipping file of articles taken from this journal. He uses a loose-leaf scrap book and files the articles under such heads as Quadruplex, Duplex, Repeaters, Selectors, Poles, etc., the classification being carried out to meet his individual ideas and needs. He now has a complete record of everything that has been published on telegraphic subjects from the time he began up to the present.

This method of keeping track of published articles and items has met with favor in other lines and is probably one of the simplest and most satisfactory, for it enables one to look up the record on any particular subject in the shortest time possible. The ideal filing system would be the memory, but very few of us indeed are endowed with brains so highly developed as to enable us to locate a particular item from memory without resorting to artificial means.

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New Canadian Press Association.

Another leased wire circuit was added to the Associated Press on January 1, serving the papers in Eastern Canada. In the past these papers have been served by a report taken from the New York state wire at Buffalo, the franchise being controlled by the Canadian Pacific Railway Company's telegraph department. The increasing prosperity of the Canadian papers and the desire for a change that would bring them into a closer working arrangement with the Associated Press, led to the formation in the fall of the past year, of the Canadian Press, Limited. The new organization follows very closely the same plan of organization as the Associated Press, and, like it, is a purely mutual and non-profit making concern. A contract has been signed with the Associated Press, covering all Canada. The nature of the territory to be covered and the conditions prevalent, rendered a sectional plan of organization advisable, and while the Associated Press franchise is controlled by the Canadian Press, Limited, the news distribution service is divided into four districts, each of which is independent of the others. These four districts are: British Columbia, which takes the Associated Press report at Seattle, over a leased wire; the Western Associated Press, which covers the provinces of Manitoba, Alberta and Saskatchewan, and which has a leased wire between Winnipeg and St. Paul; the Ontario and Quebec division, covering the provinces of Ontario and Quebec, and the Maritime provinces. These two latter districts obtain their Associated Press service from the head office of the Associated Press over a leased wire of the Postal Telegraph-Cable Company and the Canadian Pacific Railway telegraphs running from New York to London, Ont., via Montreal, Ottawa and Toronto, and with a leg to Quebec. The Maritime Provinces papers are served from Montreal over the Canadian Pacific Railway wires on a word basis, the rate depending upon the number of papers served. Local conditions rendered a further division of the Ontario and Quebec section advisable, the morning papers assuming responsibility for the morning service and the evening papers for that for day papers. While entirely separate in regard to financial and administrative matters, the two sections work together in the preparation and covering of news matter. The morning papers opened their service on January 1. Mr. Edward F. Slack, of the Montreal Gazette, is manager of the morning paper service, while the chief operator is Mr. A. F. Haralson, who has had experience on press circuits in the United States, and who has succeeded in getting together a first-class staff of operators. When the service opened a heavy sleet storm caused severe wire trouble, and the same conditions prevailed the following night. For the remainder of the week the wire was in first-class condition, working from 5 p. m. to 3 a. m., handling an average of over 14,000 words per night. Considering that in addition to the Associated Press service from New York, which averaged about 8,500 words per night, an average of 5,500 words per night was handled from six Canadian points at which copy is filed. No small share of the credit for this is due to Mr. E. V. Wedin, Jr., who is the operator in the New York office of the Associated Press. The editor of the service in New York is Mr. P. T. Ahern, who resigned from the New York Tribune staff to accept the position.

The day paper service, which is managed by Mr. Charles O. Knowles, until recently news editor of the Toronto Telegram, covers the same field as the morning paper service, with the addition of Hamilton, in which city there is no morning paper at the present time. This service went into operation on January 16.

The president of the Canadian Press, Limited, is Mr. J. F. MacKay, of the Toronto Globe, and the secretary-treasurer is Mr. J. E. Atkinson, of the Toronto Star. The board of directors represent the leading Canadian papers from the Atlantic to the Pacific.

Preservative Treatment of Poles in Hungary.

The Hungarian method of impregnating pine poles with coal tar oil, as described by Mr. Bela Gati, manager of the Royal Hungarian telegraph and telephone experiment station, at Budapest, Hungary, in a paper read before the telegraph and telephone conference held in Paris last September, consists of making incisions through the tracheid cells in the lower part of the pole by mechanical means to facilitate the penetration of the liquid, while the upper part of the pole is treated superficially, the wood absorbing what oil it will naturally. Experiments were made to determine the form, size and depth of these tiny openings. It was found that under ordinary circumstances the action of the atmosphere penetrates the soil for a depth of one meter, and that below that distance the ground is sterile and does not act detrimentally upon the wood. Therefore, it was determined that the perforations should cover a length of two meters, thus allowing ample margin for protection.

At the Püspokladany impregnating plant it has been found that effective distribution of the oil is obtained by making incisions twenty millimeters in depth, and by subjecting the pole to a pressure of fifteen atmospheres for one hour it was possible to secure a penetration of twenty millimeters deep in the butt and an average depth of five millimeters in the upper part. The quantity of oil required per cubic meter was found to be about ninety kilogrammes. Incisions to a depth of twenty-five millimeters absorb about 110 kilogrammes and at 30 millimeters from 130 to 140 kilogrammes. The experiments proved conclusively that this method of treatment produced absolutely reliable results.

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QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER XXXIV.

What is a three-wire repeater?

What does it consist of?

What is the ordinary method of working three wires together?

Describe the operation of the three-wire repeater.

CHAPTER XXXV.

What is an office loop?

What apparatus does an office loop consist of?

What is the object of an office loop?

How are duplex and quadruplex sets usually arranged in large offices?

If it is desired to cut off the broker loop and use the office loop alone what must be done and what happens when the switch is turned?

CHAPTER XXXVI.

What is the combination set for duplex or single line circuits used for generally?

Trace the circuits for battery and generator connections and note the difference between the two.

Under what circumstances are the branch office sounders operated by the regular duplex-set local battery in the main office?

What is the effect of turning the switch lever to the left, and what is the effect when it is turned to the right?

Why is a local battery in the branch office required for the sounder shown at the left in Fig. 109.

CHAPTER XXXVII.

What is the rule to ascertain the number of cells of battery to employ in order to obtain a given current in a circuit having a known external resistance?

Work out an example on the basis of this rule, substituting numbers for the letters in the formula and performing the operations indicated.

CHAPTER XXXVIII.

What is the rule for ascertaining the number of cells required to operate four-ohm sounder circuits, also for 150-ohm relay circuits?

Do these rules meet every condition of circuits? State reasons.

What is the standard resistance of sounders used on local circuits?

How much current do they require?

How much current does a single 150-ohm relay require to work satisfactorily?

Why does a relay of 150 ohms resistance consume less current than does a sounder of four ohms?

How many cells of battery are required to operate a sounder circuit having an external resistance of fifty ohms?

Find out the number of cells required for a relay circuit with an external resistance of 4,000 ohms.

CHAPTER XXXIX.

How does the telephone work?

What action takes place upon a telephone wire?

Are the sound waves (from the voice) conveyed over the wire mechanically, or electrically?

How is the strength of the magnetic field in a telephone transmitter varied?

Describe the effect of such variations upon the receiver.

Was a battery required for the operation of the original Bell telephone?

Who were among the first to produce a more powerful transmitter than the one above referred to?

Did they use a local battery?

What kind of electric current is it that carries the electrical impulses over telephone wires?

What are the means of producing telephonic transmission currents?

Explain how induced currents are produced.

How did Edison produce a variable resistance in the local telephone circuit?

What is the principle upon which the Blake transmitter was constructed?

Compare the Edison transmitter and the Blake transmitter.

(To be Continued)

Novel Telegraph Receiver. — A curious telegraph receiver is described in a recent issue of the *Elektrotechnische Zeitschrift*, of Berlin, Germany. It contains an electromagnet of special form around the poles of which is a gas chamber divided into two compartments by a membrane. On the membrane an armature is affixed, between the two poles. Small gas tubes are fixed to the chambers, and gas admitted. When the gas is lighted at the tube openings the vibration of the diaphragm, which is caused by the movements of the armature, varies the pressure of the gas in the chambers and causes a corresponding variation in the brilliancy of the gas flames. The signals are read from the fluctuating gas flames.

Girl Messengers in Indiana.—Representative John J. Keegan proposes to introduce a bill in the Indiana legislature to prohibit the employment of girls as telegraph messengers in that state.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher,
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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February 1, 1911.

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

Long Distance Underground Telegraph Lines.

The subject of long-distance underground telegraph circuits is one that is pressing upon the attention of the telegraph and telephone companies. There are several reasons for this. In the first place the growing scarcity and increasing cost of poles is rendering new construction work and renewals very expensive, and in the second place public sentiment is growing more insistent in its demand to have the wires placed underground, even in rural communities. Existing pole lines are in many instances overloaded with wires, and the loss of even one pole from any cause means the disablement of a large number of circuits, usually important ones. Pole lines develop weakness in heavy storms and the damage done to telegraph and telephone lines by a winter's gale is always a very serious matter to the companies, both financially and materially. The damage is usually wrought in exposed situations, such as along railroads and country roads, and the problem is how to avoid these losses of property and consequent loss of business. Obviously one way to do this would be to place the wires underground, even along the country highways, where they will not be exposed to the ravages of storms.

The American Telephone and Telegraph Company has taken up the matter in real earnest and is laying wires underground over the entire distance between Boston and Washington, by way of New York, and the British post office has laid underground wires between the principal business centres, including London, Liverpool and other large cities.

As far as placing wires underground is concerned the problem is not only one of cost but of continuity of service. The installation and maintenance cost of a long distance underground system is very great and it will require careful calculation to determine how far such operations can be carried. Underground lines are subject to many adverse conditions that are not met with in aerial line construction. Electrolysis is an ever-present foe, and requires bonding of the cables to minimize its destructive effects. In city streets underground construction is relatively substantial and reliable, but along country roads there is greater liability to interruption. An important matter to consider is that of repairs to the cables. Cables are expensive, and an injury to one wire often means incidental injury to all. Then in order to maintain the service a new section of cable must be substituted, to remedy a fault perhaps trifling in itself but large in consequences.

Granting the desirability of long-distance underground plant it is evident that the problem as viewed from the companies' standpoint is one of such magnitude as to stagger them in its contemplation. It may be possible to meet the situation by a compromise that will be at least fairly satisfactory to the public and the companies. The companies no doubt would be very glad to adopt any reasonable measures to preserve their property from destruction, and they can be depended upon to do that when they are fairly certain that the end will justify the means.

Public Service Commission in Washington.

In his annual message to the State Legislature Governor Hay of Washington recommends the abolition of the Railroad Commission, the Tax Commission and the office of Insurance Commissioner, and the creation of a Public Service Commission. The Public Service Commission would undertake the duties now carried on by the Railroad Commission in reference to transportation, telegraph and telephone companies, with the added powers of supervision and regulative control over light, power, gas, water and irrigation companies or corporations doing business in the State.

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Success and Hard Work.

There are in the world many people who delude themselves with the belief that men attain success and prominence in business more frequently through some outside influence, such as favoritism, etc., rather than by inherent merit. It may be safely stated that no greater error of belief was ever committed. The men who have achieved success have worked hard for it and they are entitled to much credit for their perseverance because they have helped to make their fellowmen happier in one way or another. Certainly this cannot be said of the faultfinder.

Another mistaken notion is that those occupying prominent places in business live on "Easy" street and all they have to do is to draw their salaries and have a good time generally. This, too, is far from the truth. These men do not belong to unions and work eight hours a day. They are on deck and on watch all the time, planning for the betterment of the interests entrusted to them.

A notable example of success through hard work is that of Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and the Western Union Telegraph Company. Mr. Vail occupies these important positions because he has demonstrated his ability to fill them. He is a tireless worker and wherever he goes and at all times he is never without a pad and pencil to jot down ideas. Great things are developed from ideas and Mr. Vail has lived this principle all through his business career. Everything he has undertaken has been successful.

Along this line of thought the following article from a prominent authority is worth wide circulation and careful reading. It is full of promise for the ambitious young man:

No, young man, there isn't any chance for you at all. The corporations have swallowed up every opportunity, and all that is left for you is to be a hewer of wood and drawer of water—

Unless you are a young man of good character.

Unless you are a young man of intelligence.

Unless you are a young man of energy.

Unless you are a young man willing to put in your best licks all the time, and not spend most of it complaining because you work too hard and get too little pay.

Unless you make up your mind that in every honorable way you are going to succeed.

Otherwise you have a dark future, for which you need not pay a dollar to a fortune teller to inform you.

But if you are all of these things, you have a better chance to get ahead than any young man ever before had in this country.

Take the case of Charles H. Markham, who was recently elected president of the Illinois Central Railway Company, at a salary of $50,000 a year. Less than thirty years ago he was a day laborer on a western railroad and got $1.25 a day. Did he spend his spare hours grumbling over his hard lot? Did he make up his mind that corporations were grinding out the life of the people and try his best to down them? He did not. He did with his might all his hands found to do and with such intelligence that he has never been idle or unemployed an hour when he wanted to work.

Practically every man in great executive positions in this country has had the same experience. Practically every such position in future will be filled by men who have worked up from the bottom. It is not the sons nor favorites of rich men who are going to get the big positions in this country, but those who are able to fill them after a career which has demonstrated fitness. Everybody knows Napoleon's saying that there was a marshal's baton in the knapsack of every private soldier, and the spirit of it is true of civil or industrial life. There is success for every young man in this country who deserves it.

Messengers' Clubs.

The idea of establishing clubs for messenger boys seems to be a long step forward and is meeting with wide approval. It certainly would be to the advantage of the telegraph companies to employ boys of good character to start with and use every endeavor to keep them permanently in the service, employing every legitimate means to help them along morally and physically.

An interesting article from a former messenger, and now prominent in business, appears on another page of this issue. The writer strongly advocates the boy club idea and points out the advantages to all parties concerned that would result from its practical application. The boys' club on the East Side of New York City, referred to by our correspondent, was started thirty-four years ago by the late E. H. Harriman. It was established to give the miscellaneous denizens of that section of the city an opportunity to help themselves. It is not a charitable institution, a small fee being charged for membership privileges. It has accomplished a great deal of good mentally, morally and physically among those whom it was intended to benefit, and it does its work unostentatiously. The membership is divided into three grades, i. e., juniors, intermediates and seniors, and last year nearly 5,000 juniors registered. There are no restrictions that any self-respecting boy cannot comply with. This institution might serve as a model for others of its kind, and messenger boys could easily be induced to avail of the advantages offered. The companies could with great benefit to themselves co-operate in a movement of this sort and see that the welfare of their messengers is looked after. The object is a worthy one and is certainly of sufficient importance to deserve the most careful consideration.

Copies of electrical books covering the electrical industry may be purchased at the office of Telegraph and Telephone Age, 253 Broadway, N. Y.

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Line Testing by Indicating Instruments.

In our issue of January 16 was printed the first part of an article prepared in the office of Mr. W. E. Athearn, engineer of equipment of the Western Union Telegraph Company on the subject of testing telegraph lines by a volt-mil-ammeter, designed by the engineer of equipment for convenient operation at the switchboard.

The installation and operation of the instrument were there considered and now general tests of wires will be taken up.

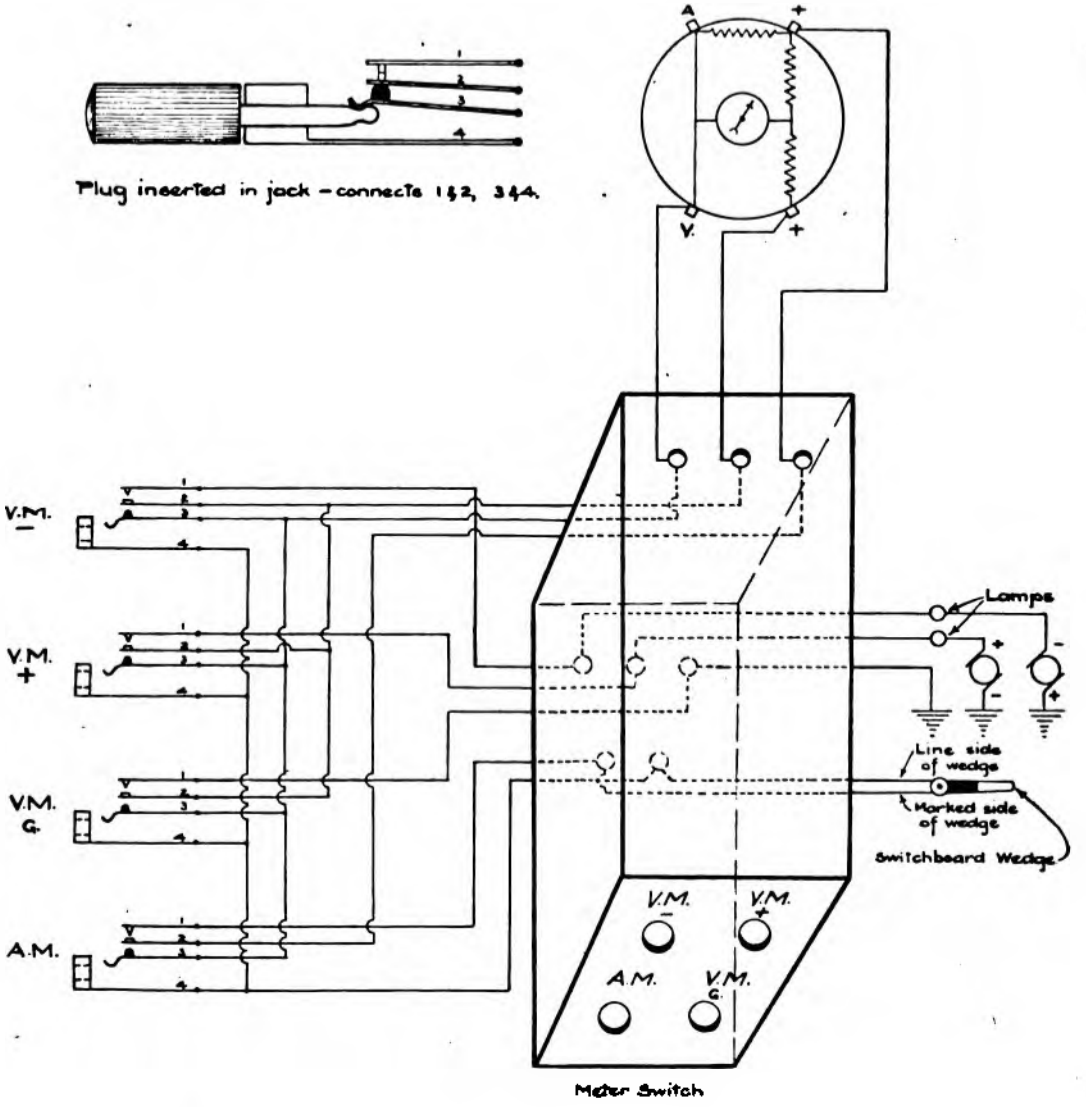

FIG. 5.—DIAGRAM OF JACK BOX AND CONNECTIONS.

GENERAL TESTS OF WIRES.

The following instructions cover the general tests made whenever it is desired to determine the condition of a wire; for example, when it is suspected that a wire is in trouble or at the daily tests of all wires made before the hours of heavy traffic. The readings of the voltmeter or mil-ammeter are not often recorded at such times, but are observed for comparison with similar readings on other wires or with tables of resistance values corresponding to the meter deflections.

To test a wire.—The first test to be made is to determine whether or not the wire is clear, that is, well insulated from the earth and other conductors. For this purpose the wire is opened at the distant end of the section to be tested. At the testing station the volt-mil-ammeter is applied by inserting the wedge connected with it, in the switchboard spring-jack of the wire, with the marked side of the wedge outward; that is, the marked side of the wedge connects with the working battery of the wire plugged on at the proper disc, while the unmarked side connects with the line to be tested. Care should be taken that any other wires which might be crossed with the wire to be tested are connected to either battery or ground. If they are working wires, this is of course provided for by the regular working battery and it is unnecessary to disturb them, but if

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such wires are out of service they should be grounded while the tests are being made.

The connecting plug is then inserted in the jacks of the jack box as follows (see Fig. 5), and the reading of the meter observed each time:

No. 1. Plug in jack marked "VMG,"
No. 2. " " " " "VM+,"
No. 3. " " " " "VM—."

The results obtained in these three operations may be analyzed as follows.

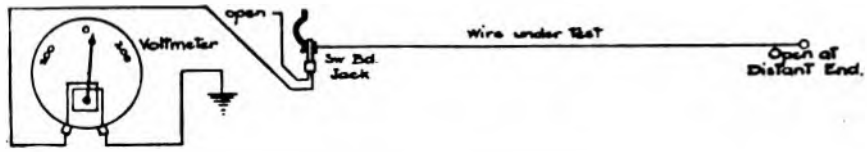

FIG. 6.—VOLTMETER CONNECTIONS.

1. The insertion of the connecting plug in the "VMG" jack, as may be seen by tracing out the connections shown in Fig. 5 connects the voltmeter portion of the instrument as shown in Fig. 6, leaving open the circuit of the regular switchboard working battery. It is evident that the only way in which the voltmeter needle can be deflected in this case is by contact between the wire under test and some other conductor having a voltage, positive or negative, to the ground. If this voltage is positive the voltmeter needle will be deflected to the left; if negative it will swing to the right. There are several ways in which such a voltage may be met with: The distant station may have failed to open the wire and left his working battery on; or the wire may be crossed with a working circuit; or it may be leaky or grounded at a point having considerable ground potential. The first condition is usually easy to detect by the high and steady reading of the voltmeter. If the wire is crossed with a working circuit the fact is often apparent by the rapid movement of the needle in response to the Morse signals and it is generally a simple matter to pick out the working circuit by watching the needle while the working battery is removed in turn from each of the wires likely to become "mixed up" with the one under test as the needle will come to rest (though probably not at zero) as soon as the working circuit referred to is interrupted. It is possible, however, if the working circuit were not in use at the time, that the voltmeter needle might show a steady deflection or even remain at zero, in which event the "cross" would not be discovered until the operations numbered two or three were performed. The third condition—a deflection due to ground potentials, is most commonly noticed on wet days and generally shows a reading of only a few volts varying rather slowly.

2. With the wire still open at the distant end, and the connecting plug at the jack box transferred from the "VMG" jack to the "VM+" jack, the connections are as shown in Fig. 7, the regular switchboard working battery still remaining disconnected, as before, as special taps of the "second potential" are used entirely with this voltmeter. A deflection is almost certain to be obtained in this case, unless the insulation of the wire is perfect, for it is evident that if there are any leaks at all, such as those shown by dotted lines in Fig. 7 a current will flow from the generator or battery through the voltmeter, out over the line and return through the leaks and the ground or other conductors. This current will deflect the voltmeter needle to the right, the amount of the deflection depending on the amount of leakage or the resistance of any fault that may be present. If the leakage is slight, as in the case of a good wire in clear weather, the deflection will be only a few volts. If there is a high resistance fault on the wire or if it is leaky, the voltmeter reading will be considerably higher, and if the fault is a "solid" cross or ground the reading will be almost equal to the voltage of the testing battery. The distinction between a cross and a ground is usually made without difficulty. A cross with a working wire would generally be indicated by the first operation, when the connecting plug was in the "VMG" jack as previously explained; if not, it will show up in either this operation or in operation No. 3, by giving a high volt-

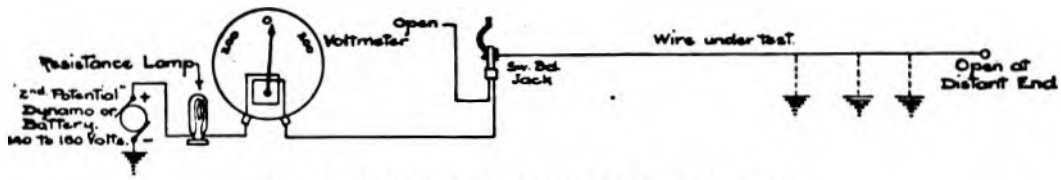

FIG. 7.—TESTING FOR INSULATION, LEAKS, ETC.

meter reading, probably much in excess of the testing voltage. A cross with a grounded wire will give the same results as a ground, but as the wire chief knows which wires he has grounded for the test, he will open such wires one by one, watching the voltmeter needle to see whether any change occurs; the needle will drop to a much lower deflection as soon as the ground is removed from the crossed wire, but if the fault on the wire under test is a ground no change in the deflection will result.

3. After noting the deflection obtained in operation No. 2, with the wire still open at the distant end, the connecting plug is transferred from the

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"VM+" to the "VM—" jack, making the connections as per Fig. 8, which is identical with Fig. 7, except that a special negative tap of the "second potential" is now used as the testing battery instead of the special positive tap previously used; the regular working battery at the switchboard is still cut off by the jack box connections. The voltmeter deflections will of course be reversed by the above change, the needle now swinging to the left. Usually the deflections obtained with the negative battery will not differ greatly from those obtained when the "VM+" jack was used. It is necessary to take the two readings, however, because the leakage in other conductors, and the only remaining test is to determine whether or not it is intact. This is done by having the distant end ground the wire. The voltmeter or mil-ammeter is left in circuit at the testing station and as soon as the distant ground is applied the needle will indicate the fact by an increased deflection, provided the wire is continuous. If the voltmeter is being used the reading will be very nearly as high as the voltage of the testing battery; if the mil-ammeter is being used the deflection will depend on the resistance of the wire but should be considerably higher than the deflection obtained previously with the distant end open. Should the

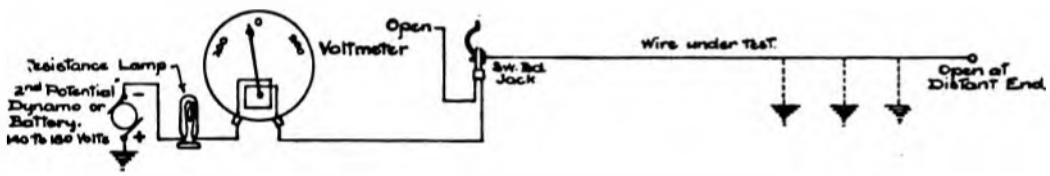

FIG. 8.—TESTING FOR INSULATION, LEAKS, ETC.

the first case may be at a point where considerable earth potential exists, or there may be a cross with another wire having some potential; and either of these potentials might be such as to oppose the current from the testing battery thus giving a much lower deflection of the voltmeter needle than would be the case if these opposing potentials were absent. By reversing the testing battery in this way, such effects are at once brought out since they then increase the deflection as much as they previously decreased it.

The amount of the deflections obtained with the connecting plug in the "VM+" and "VM—" jacks will vary widely with the weather conditions. To make the mil-ammeter test, the connecting plug is inserted in the "AM" jack, which makes the circuit as per Fig. 9. It will be noticed that the special testing taps are no longer used, but instead the regular switchboard working battery is connected by a plug at the proper disc. This plug should usually be so placed as to apply the "second potential" for this test. While it is easy to calculate the resistance in circuit for any deflection of the mil-ammeter needle by the application of Ohm's law, as already explained, such figures are not often required in this test. Instead, the principal value of mil-ammeter readings under these conditions is in the comparisons they enable us to make between one wire and another.

The tests so far outlined will show whether or not the wire is clear, i. e., insulated from the earth and wire be broken or open at any point, the application of the distant ground will not affect either the voltmeter or the ammeter at the testing station.

To MEASURE CURRENT.—For satisfactory operation of telegraph circuits the strength of current must be kept within certain definite limits. In the case of a simple Morse circuit equipped with 150-ohm relays, these limits are forty and sixty milliamperes with thirty-five-ohm relays on such a circuit, the limits are fifty and seventy milliamperes. For a quadruplex circuit, with the grounding switch thrown at the testing station, the "long end" of the distant battery should give between sixty and seventy-five milliamperes and the "short end" between twenty and twenty-five milliamperes, the mil-ammeter being cut in between the set and the line wire

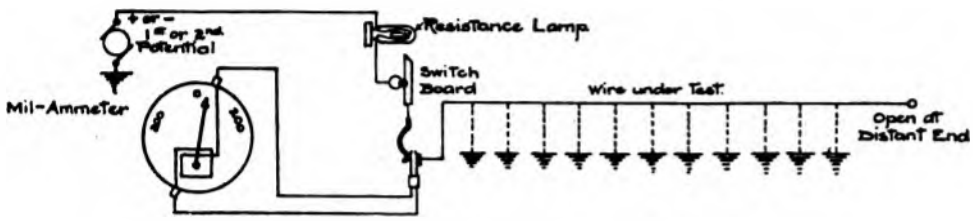

FIG. 9.—MIL-AMMETER TEST.

at the testing station. For a polar duplex a similar measurement should show twenty-five to forty milliamperes. To make these tests with the volt-mil-ammeter, the connecting plug is first inserted in the "AM" jack at the jack box, which connects the instrument as an ammeter to the switchboard wedge. That wedge is then inserted with the marked side outward in the spring-jack of the wire under observation on the line side of any other wedge or wedges that may be already occupying that jack. The meter will then indicate in milliamperes the strength of the corresponding to a positive voltage at the distant end current flowing in the wire, a deflection to the left and vice-versa.

It may be noted that this use of the mil-ammeter

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is of great value in bad weather for indicating the amount of working margin to be expected of a wire.

To test distant battery.—This test is identical with operation No. 1 under the heading "To Test a Wire," except that the wire is not opened at the distant end. The volt-mil-ammeter wedge is inserted, marked side outward, in the spring-jack of the wire over which the reading is to be taken. The connecting plug is inserted in the "VMG" jack at the jack box, and the meter indicates the voltage of the distant battery; if the latter is positive, the needle will swing to the left, and if negative to the right. These readings will be somewhat lower than the actual voltage of the distant battery, on account of the resistance of the line wire. This error only amounts to ten per cent. when the line wire resistance is 2,000 ohms, and is below that for lower resistance wires; it is therefore unnecessary to calculate this error in most cases.

(To be continued.)

Meeting of Serial Building Loan and Savings Institution.—At the annual election of the Serial Building Loan and Savings Institution, held at 195 Broadway, New York, January 17, officers and directors were elected as follows:

President, A. G. Saylor; vice-president, James R. Beard; treasurer, E. S. Butterfield; secretary, Edwin F. Howell. Directors: Thomas W. Carroll, E. M. Mulford, Thomas M. Brennan, William J. Quinn, M. J. O'Leary, Thomas E. Fleming, John A. Hill, C. A. Kilfoyle, G. W. Blanchard, Edward Reynolds, M. S. Cohen, E. E. Brannin, M. W. Ravens, H. A. Konninger, J. T. Laidlaw.

The fifty-second semi-annual statement for the six months ended December 31, 1910, shows the following assets and liabilities:

ASSETS.

Cash in bank	$ 7,475.65
Mortgages	461,261.41
Stock loans	6,705.00
Land contracts	10,866.43
Real estate	12,679.43
Advances	3,502.88
Furniture	500.00
	$502,990.80

LIABILITIES.

Shareholders cumulative	$331,578.64
Shareholders prepaid	56,400.00
Shareholders matured	35,000.00
Shareholders juvenile	806.21
Borrowed money	26,964.72
Due on loans	16,300.00
Surplus and undivided earnings	35,941.23
	$502,990.80

Transmitting Pictures by Electricity.

The Belin system of transmitting pictures has been improved with a view to the softening of the shades in the received reproductions. The inventor has substituted for the rheostat in the earlier apparatus, a microphone of special construction, which not only excludes any abrupt variation and corresponding harshness of shades, but, on account of its sensitiveness, is actuated even by the minute differences in relief present in any ordinary photographic print, so that there is no necessity of preparing any special photograph.

In the Belin system a photographic print in bichromated gelatine, presenting a series of elevations and depressions, is wound around a cylinder rotating in front of a tracing point carried by the short arm of a lever. The long arm of the lever carries a little wheel rolling upon a series of silver plates alternating with minute sheets of mica. By sliding on the elevations and depressions of the picture the double arm lever, with the wheel affixed to its end, thus inserts into the circuit a variable resistance depending upon the depth, and accordingly the shades of the various portions of the picture. The fluctuations in current intensity thus introduced into the circuit are transmitted over the telegraph or telephone line, in order to be reconverted at the receiving station into fluctuations of luminous intensity.

An article on the subject of transmitting photographs by wire was published in these columns June 1, 1910.

Beginning of Telephoning in New York City.

The October and November issues of the *Telephone Review*, of New York, contain an interesting article by Mr. Herbert N. Casson on "The Beginning of Telephoning in New York City." Among the well-known persons mentioned in connection with the pioneer work are, Mr. Willard L. Candee, now president of the Okonite Company, New York, Mr. Walter C. Humstone, formerly superintendent of the Western Union Telegraph Company, New York, Mr. Henry W. Pope, special agent of the American Telephone and Telegraph Company, New York, the late L. G. Tillotson, Mr. Charles E. Chinnock, Mr. W. H. Eckert, Mr. J. A. Seely, and others.

An interesting feature of the article is the facsimile reproduction of a letter from Mr. Theo. N. Vail, then general manager of the National Bell Telephone Company, Boston, to Mr. H. W. Pope, who was then general superintendent of the company in New York. In this letter Mr. Vail said: "What we want to do in every case is to adopt the best system."

In the article, Mr. Casson states that the first regular telephone exchange in New York city was opened at 82 Nassau Street, in March, 1879. This statement, however, is challenged by Mr. George B. Scott, superintendent and electrician of the Gold and Stock Telegraph Company, New York, who states that the first telephone exchange was started on August 1, 1878, by the Gold and Stock Telegraph Company, at 198 Broadway, using Scott's centennial private-line printer and Edison telephones and call bells, with one wire to each customer. He gives the names of fifteen customers who were connected with the company's central office on August 6, 1878. Each customer could be put in communication with the others, using a telegraph printer or an Edison telephone as preferred.

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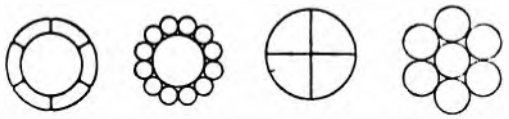
Submarine Cable-Laying and Repairing.

Mr. Charles Bright, F. R. S. E., recently delivered two lectures before the Royal Naval War College, in England, on the subject of submarine cable-laying and repairing.

After introducing his subject the lecturer proceeded to describe the interesting work of stowing cable in the tanks of a cable ship and at cable stores at stations. Proceeding, he said: This brings us to the subject of types of cables. As you are no doubt aware, the conducting wire is always composed of the purest possible copper, that having a higher electrical conductivity than any material other than silver, which is too expensive—besides being practically no better in this respect, and less satisfactory in other ways. There are different forms of electrical conductors. Electrically speaking, the solid wire is the obvious form for a conductor of given dimensions. A single solid wire is, indeed, the most suitable where only small gauges are concerned— for a short telegraph line, for instance. When, however, a larger conductor is necessary, its rigidity is soon found to give trouble in buckling through the insulating envelope. The plan of laying up several smaller wires into the form of a strand (Fig. 1) was, therefore, resorted to for the con-



FIGS. 1, 2, 3 AND 4.—FORMS OF CONDUCTORS.

ductor of long telegraph cables, the gauge and number of wires varying with the total length of the line. This is, undoubtedly, the best adapted form mechanically. Electrically, however, it is clearly at some disadvantage, owing to the interstices between the separate wires; and, in order to meet this objection, while retaining, in some measure, the mechanical features of a strand, a segmental type (Fig. 2) was adopted by Messrs. Bright and Clark on the first cable to India. But considerable difficulty was experienced in the manufacture of such a conductor; and a little later the late Sir William Siemens' form, shown in Fig. 3, —that of a large wire surrounded by a number of smaller wires—was resorted to, for combining the electrical advantages of a single solid wire with the mechanical advantages of a strand. This is the type now usually adopted for very long cable conductors, while the strand form is in universal use for lengths under about 1,000 miles—where the required speed of electrical work does not necessitate the other type. Again, for ocean cables of extreme length, the form shown in Fig. 4, due to Mr. Willoughby S. Smith, has recently been turned to account. The insulating envelope of a cable is almost invariably composed of gutta-percha, the electrical, physical and mechanical qualities of which improve so much from submergence under the depths of the ocean—both by pressure and low temperature.

Vulcanized india rubber is the only other material which is ever adopted for insulating submarine conducting wires. This is used in the case of cables laid in certain tropical waters invaded by a tiny boring insect called the teredo, and by similar insects possessing a penchant for gutta-percha. The comparative toughness of india rubber is more than these creatures of the deep can readily negotiate. For submarine purposes, gutta-percha has, however, many advantages over india rubber under ordinary conditions. In some teredo-ridden waters, gutta-percha is adhered to for the insulation, the core being covered with a thin brass taping (embedded in cotton tape, or threads) and this is found to be fairly satisfactory.

The thickness of insulating covering is dependent upon the size of the conductor, in accordance with the electrical requirements of the line. It is, in any case, essential to have a sufficient depth of insulation, strength and lightness being the main objects. A wire of comparatively small gauge, of mild steel or homogeneous hard-drawn iron, is therefore adopted, such a wire having a breaking strength up to 100 tons per square inch. For shallow water cables, however, the considerations are entirely different. Hence, in the type used for shore approaches, large metallic surfaces to withstand abrasion by rocks, etc., together with great weight to withstand lateral (shifting) strains due to strong currents or heavy seas, are of first importance. The increased quantity of metal thus entailed being more than sufficient to withstand all longitudinal stresses likely to be experienced under such conditions, an ordinary class of iron wire ("best-best" quality) of comparatively low tensile strength, say 30 tons per square inch is employed. The reduced rigidity here obtained is essential on account of the increased bulk. It will be obvious that the iron sheathing would be likely to damage the insulated conductor if applied direct. The gutta-percha, or india rubber, core is, therefore, served with a bedding of jute yarns previous to the laying up of the sheathing wires.

In any cable, as now made, there are at least three types of construction, namely, the "shore-end," the "intermediate" and the "deep-sea" (or main) cable, the last-mentioned usually constituting by far the greater portion of the entire length. The "shore-end" is employed, say, for the first two miles from each beach, in depths up to about twenty fathoms, the "intermediate," say, to a depth of 200 fathoms, and the "main" type for the remaining portion. Sometimes, however, as many as six different types are necessary for coping with the varying conditions along the route, and it is often found convenient to apply a distinguishing number, or letter, to each. The "shore-end" type is, as a rule, furnished with two sheathings, the outer composed of wires of large diameter, with an intervening layer of jute. The weight of such a cable is sometimes as much as thirty tons to the mile. Generally speaking, more or less the same quality of iron is employed for the ordinary "intermediate" type, in a single sheathing of

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wires of medium, though rather large diameter. With a view to preserving the iron from oxidation, the sheathing wires are galvanized. In the case of deep-sea types it is also very usual to apply cotton tape steeped in a bituminous mixture, galvanizing not being a very lasting preservative against rust where salt water is concerned. This preservative mixture is commonly known as Bright and Clark's compound, and is composed of varying proportions of mineral pitch, tar and silica—the latter being incorporated as an extra precaution against the inroads of the teredo. By way of a firm binding and a further preservative, the sheathed cable is, as a rule, finally enveloped in two outer servings of hemp cords, yarns or canvas tape, and then again coated with the aforesaid bituminous compound. In the case of the special shore end these outer wires appear elliptical. In reality, however, they are the ordinary circular wires, but being applied with a very short lay, this appearance is produced in true

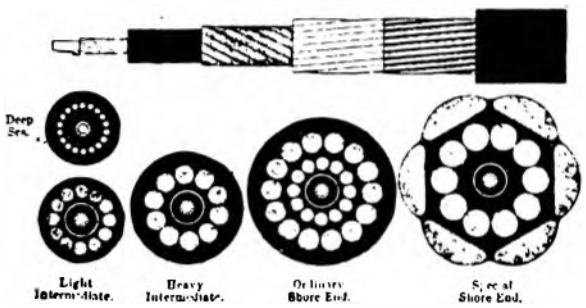

FIG. 5.—MODERN OCEAN CABLE TYPES.

section. Shore end cables of this description are now largely used where local conditions demand something specially heavy and offering a large surface to withstand the abrasion of rocks.

Deep sea (main type) cable of the description depicted in the sectional elevation is intended for up to maximum depths of three or four miles, and will bear a strain of seven tons, with an elongation of at least three per cent. Its weight being only about one ton per mile in water, it is capable of supporting a considerable length of itself. Thus, a cable can be recovered and repaired in great depths. The form of telegraph cable now in vogue is fundamentally the same as that which was first devised, but other patterns have been tried occasionally, though not with much success. At one time an attempt was made to reduce the weight of deep-sea types by introducing more hemp and less iron. Thus, in the second Atlantic cable each iron wire was enveloped in hemp, but the hemp was soon destroyed by the rusted iron wires which then remained in a loose bundle. A return was thereupon made to the close sheathed type, which has been adhered to ever since. Steady advance has, however, been effected in the quality of the materials used, and the available strength of the cable shown in Fig. 5 is 30 per cent. greater than that of the Atlantic cable of 1865.

(To be continued.)

Wireless Telegraphy and Telephony in 1910.

In reviewing the progress made in 1910 in wireless telegraphy and wireless telephony the *Electrical World* says that progress in wireless signaling during 1910 has been "of an unusual nature, since it has consisted both of advances and setbacks. The federal government has shown unexpected activity in the prosecution of a number of firms which, the authorities allege, have been engaged in the development of wireless mainly as an auxiliary to their respective stock-selling agencies. Whether or not the government will be able to prove its cases is still an open matter; but if the charges which have been brought reflect the conditions which have existed it is high time that an art so necessary to the world's welfare should be relieved of connection with unsound financial methods. The unprogressive attitude which certain of the European governments have held with regard to wireless communication has greatly restrained its usefulness to the general public as a competitor of cable signaling. During the past year, however, there has been a change, and concessions have been granted for working over some important stretches of sea. South American countries, however, are likely to benefit before we do, on account of the great difficulties which have been encountered in satisfactorily arranging for transatlantic wireless transmission. The wireless patent situation in the United States has steadily been growing more complicated. Legal activity is beginning, and it is greatly to be hoped that when decisions are handed down on the dozen or so wireless patents which are now in suit much of the confusion which has been due to the patent situation will be cleared away.

"In spite of the handicaps which are preventing ether communication from reaching its full degree of utility, it has, in the past year, given a good indication of what this may be. Half a dozen vessels, on which were 300 or more people, have been rescued by the use of wireless from positions in which the fates of the crew and passengers were at least very uncertain. However, other recent examples, such as that of the steamer *Cincinnati*, have shown how crudely the wireless is applied. The *Cincinnati* had a rough passage, and on both continents friends of the ninety-six cabin passengers were much worried, since no word could be had from the ship. On her arrival, two days overdue, it was explained that she 'was too far away to send wireless message.' This shows regrettable limitations in installing, since it is not difficult to obtain apparatus by the use of which a ship may keep in touch with land during an entire passage. One of the most significant accomplishments of the year was the long-distance test carried on by the navy in the early summer, namely, 3000 miles daylight signaling from a 600-ft. tower. When the requirements of this test were stated some time ago, wireless engineers in general considered the feat too great to be thought of in the 'present state of the art.' Nevertheless, the test was made to indicate the feasibility of the proposition, and the re-

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sult was so satisfactory that work on the high-power government station, to be located near Washington and to have a daylight range of 3000 miles, has been begun. The record figures for long-distance communication have been pushed upward. Under exceptional conditions (at night in the fall or winter) a distance of 6500 miles has been attained, and 3000 miles by daylight is scarcely more than normal working for well-equipped stations. Notwithstanding this, 'records' of much shorter distances continue to be announced from time to time. The group frequency of 1000 per second which had been quite thoroughly tried out by the end of 1909, has had a year of fairly general use, and is showing up well. The prediction that the 1000-spark per second frequency would be much more easily followed by the ear through the irregular rumblings of 'atmospheric' than are the lower rates of discharge has been well verified by experience. The navy is now installing some sixty outfits in which this higher spark frequency is used.

"The methods of theoretical engineering necessary in the design of wireless instruments are daily reaching more firm foundations. In the study of the quantities involved in electro-magnetic wave signaling it has been necessary to invent both methods of making measurements and apparatus for carrying them out. Conceptions of new physical entities and their relations with the ordinarily used quantities have had to be worked out, and the connection between standard alternating-current practice and high-frequency alternating-current practice has been established by necessity. Thus the tools for intelligent work in wireless are being rapidly developed, and the cut-and-try methods gradually done away with. The more progressive workers in the field have left the 'accepted standards,' and by evolving new methods and apparatus therefor have reached new degrees of usefulness. It is stated that by the utilization of several novel principles the harmful effects of even the worst 'static' or atmospheric interference may be completely done away with; and those who have witnessed demonstrations of the late methods and who understand their technology are indorsing this statement without qualification. The application of the method to commercial practice is expected within the next few months.

"Wireless telephony in America has suffered from over-exploitation and under-accomplishment. Promises ranging from opera music at 200 miles to telephony between New York and Paris have been very lacking in fulfilment. The majority of workers in this branch of wireless signaling have either feared or been unable to break away from the arc-and-microphone types of sender, and the general lack of progress is probably the result of this. Even the patents on space telephony have been exceedingly few, and the entire development of the science is quiet. Occasionally a wireless telegraph operator is startled by picking up a "Hello! Hello!" from the ether about him, but practically no activities are announced. It may be that development is going on without the fireworks which usually accompany work in this line, and that announcement of unusual progress may be made most unexpectedly. If this is not the case, it is to be regretted that the work has been put aside, for wireless telephony should be able to offer the solution of transmission over distances which are impossible with wires or cables."

New Typewriting Telegraph System.

The Telegraphic Mail Company, 220 Broadway, New York, is exhibiting what it claims to be a new system of telegraphic transmission. The apparatus consists of a typewriter transmittter and a like machine as a receiver; each machine performs both functions. The transmitting machine looks like an ordinary typewriter set on a base which contains all the electrical mechanism. The message is printed on a sheet of paper on the receiving instrument, as on the ordinary typewriter, the receiver being operated by the electrical impulses sent out by the transmittter. The sending operator makes a typewritten copy of his message by the same operation that performs the transmission.

Mr. Tullio Venier Giara is the inventor of the apparatus. For the purpose of demonstration, sending and receiving instruments are set up in the office of the company. Mr. Giara states that for short lines, such as between office and factory or departments, each character is provided with a conductor; thus there are as many conductors (cabled) as there are characters on the keyboard. For long lines, however, such as between cities, he states that one wire is used and that the characters are selected at the receiving end by a new method, which he would not disclose.

The system is recommended particularly for business purposes in such places as banks, factories, theatres, offices, etc. It is stated that the Teletype, as the instrument is called, will form a valuable adjunct to the telephone.

Report of New York Public Service Commission.—The New York Public Service Commission, second district, according to the fourth annual report, has jurisdiction over ten telegraph and 135 telephone corporations. The commission calls attention to the provision of the law as to special low rate contracts by telephone corporations. The statute does not say that such special contracts are unlawful, or that in fact they shall be discontinued. The burden of requiring the cessation of discriminations from that course is placed upon the commission. Until it acts such discriminations which have heretofore existed may continue, and when it does act whatever increase of rates is entailed to any individual will at once be charged to the commission and not to the corporation which has initiated and continued the discrimination.

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Loaded Submarine and Underground Telephone Cables.

A patent was issued December 6, 1910, to Dr. J. H. Kuntz, of Hoboken, N. J., covering a method of construction of cables whereby the effect of capacity is counteracted in whole or in part. The effect of the distributed capacity is counteracted by means of an inductance, and it is stated that by the construction described a cable can be produced with an inductance as large as may be required for the given conditions, and, what is more important, the amount can be predetermined and the dimensions of the elements of the cable so fixed as to secure the proper adjustment in a way mechanically simple and commercially practicable. The conductor is disposed helically about a core, which may or may not be of iron, depending upon the amount of inductance desirable. In the case of a submarine cable with capacity and resistance such as are encountered in actual practice the amount of inductance necessary to neutralize the capacity is calculated and then the dimensions and arrangement of the core and conductor are determined from these data. The specifications give an example of such a calculation. In the case of an iron core the strands are of fine soft-iron wire, which may be insulated from each other by a coating of oxide, or they may have a thin coating of insulating compound.—*Electrical World.*

Demagnetization of Receivers on Telephone Train Dispatching Circuits.

At the meeting of the Eastern Division of the Association of Railway Telegraph Superintendents, held in New York, November 16 and 17, 1910, a discussion took place on the demagnetization of receivers on telephone train despatching circuits.

Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway Company's Telegraph, Montreal, brought the matter to the attention of the meeting. He stated that sometimes, almost before a circuit was in operation the receivers on the station telephones would become demagnetized, then others would become demagnetized in the course of a month or two. Some of the members reported that they had experienced similar trouble on their circuits, while others had not observed anything of the kind.

It had been suggested that the mass of iron in the arm tended to demagnetize the receivers, but this theory does not seem to have been supported by the facts.

Mr. Camp stated that he had found it difficult to get any explanation from the telephone people.

Mr. A. B. Taylor, superintendent of telegraph of the New York Central Lines, New York, stated that his experience in connection with receivers made by a leading company was that the first lot were built up with three separate parts, and he lost quite a number of receivers of that type of construction, but since then the manufacturer has made them in one piece, and that has practically eliminated all of that trouble.

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.]

(7) Q.—How can the plates of a storage battery be distinguished by their color? O. C.

A.—When the plates are fully charged and in good condition, the positive plates have a dark reddish brown or chocolate color; the negative plates have a gray or slate color. The plates may also be distinguished by the relative hardness of the active material. The lead peroxide on the positive plates is hard, like soapstone, while the material on the negative plate is soft and can be easily cut into with the finger nail.

(8) Q.—What is the speed in air of electromagnetic waves used in wireless telegraphy? B.

A.—The speed of electromagnetic waves through air is approximately 186,400 miles per second, which is equal in distance to seven and one-half times around the world. This is the same speed as light.

(9) Q.—What is the length of wave commonly employed in wireless telegraphy? L. T.

A.—The wave length may vary from 100 yards to six and a half miles, corresponding to frequencies between 3,000,000 and 30,000 cycles per second. An ordinary wave length would be say 328 yards long with a frequency of 1,000,000 cycles per second.

(10) Q.—How can I place a Wheatstone transmitter in circuit on Wheatstone automatic repeaters so that the repeating station may, when traffic between the terminal stations is clear, put on a transmitter and utilize the repeaters for transmitting his business at high speed? J. W. B.

A.—In Maver's "Telegraphy," 1897 edition, there is a diagram of such an arrangement. If the transmitter is connected in circuit as shown, and special wires are taken from the binding posts to the necessary battery connections on the repeater board, the arrangement will work all right.

(11) Q.—How is selective ringing accomplished on party telephone lines? E. B. F.

A.—There are two principal methods of selective ringing on party lines. In one the ringer is so arranged that it will respond to currents in one direction only. Such a ringer is called a biased bell. Selection between four stations on a line may be had by connecting two biased bells, one of each polarity, between each limb of the line and ground. By sending positive or negative pulsations of current from the central station over one limb of the line, any one of the four bells may thus be made to respond to the exclusion of all the others.

(12) Q.—What is the purpose of amalgamating battery zincs, and how is amalgamating done? T. P.

A.—Zincs are amalgamated to prevent loss of energy due to "local action" within the cell. Local action always takes place when commercial zinc is placed in acid solution. Commercial zinc contains

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foreign substances, such as bits of iron, carbon or other conducting bodies. When these foreign bodies are acted upon by the acid they form closed local circuits, and the zinc is eaten away in patches, or pits. Zincs are amalgamated by first cleaning them by dipping in diluted sulphuric acid and then rubbing mercury over the surface. The action of the mercury seems to bring pure zinc to the surface, while the foreign substances are left behind and fall to the bottom of the cell.

(13) Q.—What is the method of charging a storage battery cell by the current from a loop? B. T. C.

A.—As the answer to this question would take up so much space, we refer our correspondent to Mr. Jones' book of descriptions and diagrams of telegraph apparatus. On page 130 of that work a full description is given for charging a storage cell in this manner.

(14) Q.—What is the difference between a Daniell cell and a gravity cell of battery? M. A.

A.—There is no difference in principle, only in form. The gravity cell is a modification of the Daniell cell and was designed to avoid the use of the porous cup of the Daniell cell. The solutions of zinc and copper sulphate are kept separated in the gravity cell by reason of the difference in their densities, whereas in the Daniell cell they are kept separated by the porous cup.

Among Our Advertisers.

Under this heading we propose to keep our readers informed as to what the telegraphic and telephonic business interests are doing in the production of new apparatus. It will be a department worth reading, and will be of a newsy character. Advertisements of these concerns will be found on other pages.

A visit to the establishment of J. H. Bunnell & Company, 20 Park Place, New York, the old-established manufacturers of telegraph apparatus and dealers in general electrical supplies, made it evident that the old-time activity of this house is still maintained. They keep up to date in all their processes and products, and indeed manage to keep in advance of the demand for new things and new ideas. The company was organized in 1878 and established at the start a reputation for furnishing first-class goods, and this reputation has always been jealously guarded. There is nothing in the way of telegraph, telephone and general electrical supplies that this house cannot furnish. Their wireless outfits are of the best make and are reliable in operation.

Finding fault is not a very enviable trait of character, but there are times when fault finding is certainly justifiable and even desirable. Finding faults on telegraph and telephone lines, for instance, belongs to the latter class, and a good and certain way to succeed in this is by using the Friendly testing bridge made by W. & L. E. Gurley, Troy, N. Y. The name Friendly is suggestive, and might be taken to mean the relation of the instrument to the work. Whatever it means, the instrument does the work to perfection, and it does it quickly. Any one desiring to know more about this instrument can secure the information by addressing W. & L. E. Gurley, Troy, N. Y., who are the licensees.

It is not very pleasant to those who are compelled to use head telephones to carry the burden of the ordinary instrument upon the head and submit to the continuous pressure of the hard rubber receivers upon the ear. Wireless operators should be thankful to the Holtzer-Cabot Electric Co., Brookline, Mass., for producing a head receiver that is at once light in weight and easy in pressure upon the ears. Lightness is secured by using aluminum and easy pressure by the use of pneumatic cushions. The thing has been studied out carefully, and the long-standing reputation of this well-known house is back of this particular device, as it is in the case of all the other products of this firm.

We are in daily receipt of letters from telegraphers in all parts of the country asking where they can learn the principles and practice of wireless telegraphy. Dodge's Institute of Telegraphy, Valparaiso, Ind., gives instruction in wireless telegraphy and has a complete commercial station in operation for instruction purposes. This branch of instruction is in charge of a competent wireless telegraph expert, and the instruction is thorough. Those who desire to learn the art of wireless telegraphy would do well to communicate with the institute.

Mr. C. H. Murphy, manager of the Western Union Time Service, New York, has recently returned from a trip through West Virginia, where he succeeded in interesting a large number of the Western Union managers in the time service with the result that considerably over one hundred additional clocks have been contracted for. There seems to be a general awakening of interest on the part of the Western Union managers in the clock service, and evidently Mr. Murphy is encouraging the managers to do their utmost to increase this branch of the company's business. There is every indication that the year 1911 will prove highly satisfactory from a time-service standpoint, both to the Western Union Telegraph and Self-Winding Clock Companies, the latter concern being the manufacturer of these clocks.

The typewriter is frequently referred to as "The Barometer of Trade," and an increased demand for typewriters is an indication that general business is active. The Remington typewriter has been extensively used by operators simply because it is a first-class machine and can always be relied upon. The Remington Typewriter Company is enlarging its plant at Ilion, N. Y., to produce machines in greater quantities in order to meet the demand for them. This concern has a very large and completely fitted out plant, and has reduced the manufacture of typewriters to a science.

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Lifting Up the Messenger.

An ex-messenger, a successful business man in New York, reflecting upon the article in the January 16 issue under the heading "Lifting Up the Messenger," has written us commenting favorably upon the efforts being made in many places throughout the country to uplift the telegraph messenger boy. Our correspondent says:

"It is very gratifying to thousands of your readers who are ex-messengers to see, for perhaps the first time, the amount of space in your valued paper devoted to the telegraph messenger. It would seem from your issue of January 16 that the telegraph officials are becoming deeply interested in the welfare of the messenger, and that his work is beginning to be appreciated; in fact, he has become recognized as an apprentice and not as a temporary porter or runner. The action of the telegraph officials, organizations and individuals, who have with kindness and generosity provided entertainments and dinners for the messengers during the recent holiday season is highly commendable, and it seems to me that no more gracious-patriotic if not philanthropic proposition could be evolved than the founding of messenger boy clubs, especially in the larger cities of the United States. The building up of the American youth in all that goes for manhood and decent citizenship should be the greatest of all endeavors, and there are doubtless many ex-messengers blessed with much of this world's goods who need only the presentation of a proper plan to come to the front and assist in forwarding a movement of this kind. I am informed that the late Mr. E. H. Harriman organized and endowed the boys' club in New York city, which has done a world of good in developing both physically and mentally the youth of the East Side.

"The youth needs play; play is necessary for development. It is a mistake to imagine that a boy of fourteen or fifteen years of age can go direct from school to business with enthusiasm, if his opportunity for recreation be cut off. This is the time in his life for the strengthening of character and physical development. A well-regulated gymnasium, a well-equipped library, and a lecture hall suitable for entertainments of a clean character would be productive of the greatest value to the youth of America, and the founders of such an institution would leave a lasting memorial. I am aware that the Young Men's Christian Association has these features, but the fee required is much too large for the average messenger boy to pay and, in addition, there are many telegraph messengers that would feel out of place in the 'gym' or the lecture hall of the Young Men's Christian Association and kindred institutions. Just think of the value to good citizenship the mingling of races would produce! How soon the traditions and environment of narrow home life would be broadened by the association of boys of Irish, German, Jewish and Italian extraction. I realize that there are details in the development of the plan as outlined, but the general idea of providing a permanent telegraph messenger club or institute I think a good one, and sincerely trust that the suggestion may take root in the minds of those who are able financially to give of their store for the moral and physical training of the young American boy."

Organizer of Great Corporations.

Mr. William W. Mulford is the author of an article on "The Organization of Great Corporations" in the November issue of *The Engineering Magazine*.

"Like all wholesome American business methods," the author states, "it [organization] is a matter of evolution. The better forms have been adopted after careful studies of those already used in doing similar work. These are changed, modified, or revised to meet the conditions and requirements of the particular work; then improved and simplified in order to obtain greater efficiency and to yield larger results. Certain customs are common to many of the successful big corporations. This has gradually brought about a standardization of their forms of organization. Certain fundamental principles are so clearly recognized that they can well be considered as established. These are summed up and expressed in what is known as the 'three-column form.'

"Broadly speaking, there are three distinct branches in the work of all large corporation organizations, Financial, Operating, Commercial; all other positions or departments are either subordinate to these, or are practically consulting authorities. This holds true whether in industrials or railroads, whether in the single corporation or in the series of corporations, and whether the departmental, the bureaucratic, the divisional, or the functional form of organization is used.

"The reason why the three-column form of organization holds true in so many apparently distinctly different kinds of organizations seems to rest upon the underlying principle of an old saying—"Even in a democracy there must be a leader." This is equally true in carrying on a business. There is always a fixed policy to be carried out, although that policy may be of the *laissez faire* variety. There must be a leader; and furthermore each department, or bureau, must have a head, and these are the lieutenants of the commander in chief. But organization is the antithesis of administration. Under the three-column form of organization the distinction between administration and organization is so clear that it is instinctively understood by every employe.

"The reason why the financial, operating, and commercial divisions rather than any others are the chief is that the form of organization is not determined by the size of the department, the number of employes, or the volume of work, but by the relative importance of the work and its relationship to the policy of the company. The salient questions of finance, operation, and commerce affect directly

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the policy of the corporation and are wholly dependent upon one another. First, the money must be provided; second, the work must be done; third, the product must be sold. The best salesman cannot sell unless he has the goods to sell. He knows what the market requires, and what prices he can obtain. He knows how to create selling methods. With that given, the skilled operating man knows how to manufacture what is demanded, or to perform the service that is required. With these two given, the financial man must not only provide for the money but must ascertain beforehand whether the monetary market warrants furnishing or withholding the supply, for financial emergencies must be prepared for well in advance. These are the vital features of any business policy. In the three-column form, the vice-president in charge of finance, the vice-president in charge of operating, the vice-president in charge of commerce, are on an equality; they are peers, and have an associated authority and responsibility. . . .

"The three-column form of organization makes it possible to separate the work of direction and deliberation from the details of execution, and also makes the executives of the great vital departments parties to these deliberations in their positions of staff officials. In this rests its greatest strength.

"The employe must not only know his duties and what is expected of him, but also rather than have obstacles placed in the way he should be able to obtain in a convenient manner, in so far as they affect his work, all the information, statistics, data, and even an understanding of the policy of the company, if he desires to seek them. Unless this is done, it is impossible to avoid duplication of work; or what may be more discouraging, the employe may suddenly find out that half of the work he has done has already been done by others and probably, because they had more time for it, in a more thorough way. Here is where system becomes manifest. Here is where true *esprit du corps* is nurtured or destroyed. Here is where man's originality is crushed, or he gains the joy of achievement. . .

"In the telephone organization only two of the three great divisions of the three-column form of organization are predominant factors, finance and operating. And because there are only two, the power swings like a pendulum from one to the other, for a few years the one dictates and then the other. The commercial division has not been given an equal standing with the other two. It is said that this is because business has always come to them as fast as it could be conveniently taken care of and that they have not had to seek a market except occasionally for a by-product. However that may be, it is true that if a balance in power is to be maintained between finance and operating, it can only be accomplished through the recognition of the commercial division as their peer."

"Stickers" on Messages.—The Massachusetts Supreme Court in sustaining a verdict of $50 obtained against the Western Union Telegraph Company, holds that a telegraph company is obliged to accept a "sticker" on a message intended to fix additional liability on the telegraph company in the event of delay in transmission or non-delivery of a message. The Western Union Company, under its rule, refused to receive such a message from the plaintiff and in defense relied upon the Interstate Commerce act.

Portable Railway Telephone.

The portable telephone illustrated herewith is stated to be the lightest set used in railway telephone dispatching. It weighs only 6 lb. 5 oz., and its dimensions are 6 3-16 in. high, 6¼ in. wide and 6 in. deep. The arrangement of the transmitter, receiver,

FIG. 1. PORTABLE TELEPHONE, CASE OPEN.

batteries and induction coil is very compact as will be noted by a glance at the illustrations.

This telephone is designed for use by officials, trainmen, signal men, and line men in talking to the

FIG. 2. PORTABLE TELEPHONE, CASE CLOSED.

dispatcher's headquarters, and is arranged to connect at any point on the circuit, its compactness rendering it easy to carry and handle. It is made by the Kellogg Switchboard and Supply Company, Chicago, Ill.

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Multiplex Telephony and Telegraphy.

In the issue of January 16 announcement was made of the granting to Major George O. Squier of the United States Army, of four patents on a system of multiplex telephony and telegraphy. The objects of the invention are to permit the simultaneous transmission of a plurality of telephonic and telegraphic messages over a telephone wire, and to eliminate cross talk.

The method of accomplishing these results is described in the first patent of the series (No. 980,356) as follows:

"In the whole range of electromagnetic waves, which may be looked upon as a spectrum extending from the ultra-violet rays on the one hand to the exceedingly slow oscillations, such as are used on long submarine cables, on the other hand, use has been made of all parts for various purposes with the exception of two well defined intervals, one extending from a frequency of about 3×10^{12} of the extreme infra-red, to 5×10^{6}, which are the shortest electromagnetic waves yet produced by electrical apparatus—and another interval extending from about 100,000 cycles per second to about 15,000 to 20,000 cycles per second. This latter range of frequencies represents a practically unexplored field which I have found by experiment to be very useful in solving the problems of multiple telephony and telegraphy upon wire circuits. * * *

"By employing ultra-sound electromagnetic wave frequencies as the vehicle for transmitting telephonic and telegraphic messages, it is evident that all harmful effects to any element of the battery telephone apparatus are immediately removed, since not only are any such effects very minute, in character, by virtue of the high period of the oscillations, but also, even if there were any effects in the telephone receiver, or transmitter, or any other part of the apparatus, it could not be detected by a human being, since the natural limitations of the ear afford a most effective and sure separation between all frequencies above 15,000 to 20,000 per second on the one hand, and all frequencies below 15,000 to 20,000 and down to about sixteen per second, which is the lower limit of audibility. Therefore, a fundamental principle of this system may be said to be, from one viewpoint, the utilization of this unalterable characteristic of the human ear.

"With such frequencies as are used in ordinary battery telephony the so-called phenomenon of "skin effect" is comparatively small, and the current is fairly well distributed throughout the cross-section of the conductor. As the frequency increases the skin effect becomes more pronounced and the energy appears to be more and more transmitted or stored in the ether surrounding the conductor. For this reason the battery telephone current is largely a conduction current through metal, and the ohmic resistance of the wire is one of the principal elements which limits long distance telephony at present, whereas in commercial wireless telegraphy, in which frequencies from 100,000 up to several millions are used, the impressed energy is chiefly radiated into the ether.

"In the intermediate range from say 20,000 to 100,000 and above the energy is largely carried by the ether, but is still sufficiently linked to the conductor to prevent excessive radiation into the ether. The conductor while carrying only a small part of the energy at its surface nevertheless acts as an efficient guide for the high frequency electromagnetic waves. In accordance with these principles, use is made of these efficiently guided electromagnetic ether waves as a vehicle to carry the telephonic or telegraphic message.

"The present invention makes use of the types of apparatus, engineering methods, etc., now practiced in the wireless art and applies them to the transmission of electromagnetic waves along wires, with the result of an enormous increase in efficiency of such transmission over the ordinary method employing antennæ at transmitting and receiving stations. The circuits employed in this invention are ordinary telephonic circuits, such as now used in wire telephony and telegraphy, and are very poor radiators of electromagnetic energy; in fact, the regular twisted-pair paper-insulated lead-covered telephonic cable affords a circuit for such electromagnetic waves which produce a very closely bounded system and the energy is principally conveyed in such a circuit in the minute layer of ether separating the two metallic conductors. In this manner, and by these means, a most efficient system of directive high frequency telegraphy and telephony is attained, and also any interferences between neighboring circuits operated by this system is eliminated, so that a plurality of such circuits may be brought to the same switchboard with no harmful interfering effects.

"It is old in the art to use high frequency oscillations and modify these in accordance with speech vibrations by effecting some electromagnetic constant or constants of the circuit in which the oscillations take place. It is possible to change the capacity, the inductance or the resistance of such a circuit or combination of these, and while I do not wish to limit myself to any one of these, I have found that it is very convenient and effective to change the resistance by a suitable telephone transmitter such as a microphone transmitter of the usual type employed in ordinary telephonic work. Having modified these oscillations suitably they are transmitted over the line to a receiving station where they are then received in a suitable selective circuit containing a detector for high frequency oscillations, any detector, such as used in wireless telegraphy and telephony, being satisfactory so long as it is a quantitative or integrating detector. By means of suitable trans-

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lating means the oscillations are then transferred into telephonic currents.

"Since a plurality of high frequency waves of different frequencies may be impressed on the same line, and since these may be selectively separated from each other by suitably tuned circuits, it is obvious that multiplex telephony may be accomplished. Also, for the reasons stated, it has been found that these high frequency waves may exist on the same line with ordinary battery telephone currents without in any way affecting them, and thus this system of multiplex telephony may be applied to the usual telephonic circuits without the presence of harmful effects, such as "cross-talk" or other disturbances.

"It has been found necessary, in order to obtain efficient results, to make use of such detectors as are commonly found in the wireless telegraphic art. These detectors are not used because of any greater sensitiveness to electrical energy than resides in the telephone receiver itself, but because the energy, being in the form of rapid oscillations, cannot affect the telephone or other indicating device. These rapid oscillations cannot sensibly affect the telephone because the diaphragm in its motion must reverse with the reversal of the current and the deflecting impulse if applied directly to the telephone receiver will be first in one direction and then in the other with a frequency so high that the diaphragm cannot follow or respond. Furthermore, if the diaphragm should respond with this frequency the effect would not be audible. Also, in the case of the ordinary telephone, on account of the large self-inductance of the instrument, the high frequency E. M. F. generated by the waves would produce in a telephone receiver only extremely weak currents. I have found it necessary, therefore, and consider it an important part of my invention to make use of some form of integrating detector to transform these rapid oscillations into effects which can be manifested by the indicating instrument."

Great Industrial Corporations.

Mr. George W. Perkins, the well-known financier and organizer of industrial corporations, in an article on the subject of the future relations between capital and labor has this to say in regard to great industrial corporations:

"Whether we like it or not, whatever theories we may formulate on the subject, the great corporation is here to stay. It is as idle to cavil at its presence in the present day industrial system as it would be to find fault with the existence of electricity, the use of steam, or the employment of the telephone, the telegraph, or wireless communication. Were it not for these agencies, which have rendered possible the vast strides which have been made in the last half century in the development of material civilization, the handmaid of social progress, the great corporation, would never have come into being. The problems which confront us to-day in connection with the giant corporations are the natural outcome of the conditions which have given birth to this new form of commercial and industrial endeavor.

"The faults in corporation management have grown out of the sources from which the giant corporation has sprung. They were perhaps inherent in the conditions which surrounded the organization of these great consolidations of human effort, but the faults are such as can be eradicated by enlightened effort, and the benefits derivable from the employment of corporate cooperation are far too great ever to be abandoned. The evolution of the modern corporation has kept close pace with the progress in transportation, in manufacture, and in all forms of material development. With the advent of steam came corporations made up of a moderate number of stockholders and with the general application of electricity to the service of man and the invention of the telephone, the telegraph, and the wireless transmission of messages, came the giant corporation.

"With the opportunity which the improvement in the methods of transportation and transmission offered for extension of business undertakings it became essential to find an agency which would fill the requirements of the new opportunities. It was a natural step from the firm made up of a few men to the small corporation and from the small corporation to the great railroad or industrial combination equipped to do business not in one city nor in one State, nor even in one country, but all over the world. We cannot do away with the giant corporation except by doing away with the use of electricity and of steam and go back to the methods which our forefathers employed not because they were better than those we know to-day, but because they were the only ones then available. Only by destroying the things which make the giant corporation a possibility can the corporations themselves be done away with.

"It has become an essential part of present day business organization and it behooves us all as sensible men to make the most of the good that the corporation offers and to bend all our energy to see that such abuses as have crept into corporate management be eradicated and that the corporation itself be advanced to its state of greatest efficiency."

Electrical Testing Laboratories.—Among the many activities of the Electrical Testing Laboratories, New York, is the checking of electrical instruments, insulation tests, tests of magnets, certification of electrical standards, and many others, the latest addition being the testing of papers for any purpose, including electrical insulation.

Telegraph Facilities vs. Political Morals.—Attention is called by a western newspaper to the political corruption in Adams County, Ohio, and attributes the cause to the absence of railways and telegraph facilities at the county seat.

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The Telephone.

Mr. Chester J. McKee, of the American Telephone and Telegraph Company's office, Philadelphia, was, on January 10, married to Miss Lonthair, of Rochester, N. Y.

Mr. D. B. Grandy, of the American Telephone and Telegraph Company, St. Louis, has the sincere sympathy of his numerous friends in the death of his daughter, Alice Frances, on January 6. Miss Grandy was a teacher in the St. Louis public schools and was twenty-one years of age.

Mr. Wm. A. Blanchard, special agent of the American Telephone and Telegraph Company, was a former telegrapher. He entered the telegraph service in 1879 and afterwards became identified with the Bell Telephone service, and has occupied positions as wire chief, chief operator, district operator, district manager, and is now special agent, with headquarters in New York.

The Southwestern Telegraph and Telephone Company is erecting a new exchange building in San Jacinto, Tex. It will be eight or ten stories high.

Telephony in Russia.—Telephonic communication has been established between Moscow and Nijni Novgorod and the important cotton spinning centres of Vladimir, Shuy and Ivanovo-Vosnesensk.

Telephone Bonds.—All of the $10,000,000 American Telephone & Telegraph Company 4 per cent. collateral trust bonds sold to an N. W. Harris syndicate in Boston have been disposed of. A very large percentage of the bonds went abroad.

Telephone Extensions Along Pacific Coast.—The Pacific Telephone and Telegraph Company has floated in New York and Boston a $5,000,000 short-term note issue. The proceeds will be expended in the betterment of plant in California, Oregon and Washington.

Telephony in Switzerland.—The government has authorized the erection of long-distance telephones on the Egner and Holmström system. This system is said to allow of conversation over distances of between 3,000 and 4,000 kilometers—1,863 and 2,484 miles respectively.

Receiver for Continental Telephone and Telegraph Co.—On the application of Mr. John E. Stevenson, Judge Willson, at Philadelphia, has appointed Mr. Charles E. Wilson receiver of the Continental Telephone and Telegraph Company under a bond of $100,000.

Telephone Mergers.—It is stated that plans are now under consideration for a merger of several leading independent telephone companies in the West with the American Telephone and Telegraph Company. Negotiations to such an end are said to have been undertaken by J. P. Morgan & Co., New York.

Telephones in Winnipeg.—During 1910 the number of telephones in the city of Winnipeg, Man., increased by 3,437, making the total number of telephones there 16,161. This is said to mean a larger number per capita than in any other city in Canada. The telephone system is owned and operated by the government.

Cable Steamer for British Columbia Telephone Company.—The British Columbia Telephone Company, with headquarters at Vancouver, B. C., has decided to build a cable steamer at a cost of $35,000. The first work to be done by this steamer will be laying the new paper Pupin cable between Vancouver Island and the mainland.

Telephone Wires on High Tension Towers.—A telephone line is strung on the steel towers of the transmission line of the Mexican Light and Power Company, in Mexico, and it is stated that no serious disturbances have yet been attributed to the proximity of the power lines. The power line is operated at 80,000 volts.

Interest on Interstate Telephone Bonds to be Paid.—The six months' interest due last October on the $2,390,000 outstanding bonds of the Interstate Independent Telephone & Telegraph Company, which is now in the hands of receivers, has been deposited with the Continental and Commercial Trust and Savings Bank, Chicago, by Receivers Dolph and Niblack. Mr. Dolph says that the receivership can soon be terminated.

Telephone Rates in Texas.—The Texas Supreme Court on December 21 granted a writ of error in the case of the Southwestern Telegraph and Telephone Co. vs. the City of Dallas and the case was sent back for hearing on January 4. This is the telephone rate case involving the question as to rates and the right of the City of Dallas under its charter to regulate them through a referendum vote of the people. Three inferior courts have upheld the case.

Pacific Telephone and Telegraph Company.—The gross earnings of the Pacific Telephone and Telegraph Company for the ten months ended October 31, 1910, showed an increase of approximately $1,500,000 compared with earnings for the same period in 1909. The net earnings for this period, however, showed only $2,523,106, as compared with $2,937,407 in 1909, a decline of $414,301.

The Spare Pair Society.—The Spare Pair Society, which is composed of employes of the American Telephone and Telegraph Company in Philadelphia, held its monthly meeting in that city on Tuesday evening, December 15, Mr. R. H. Clegg, presiding. Mr. S. B. Williams, of the engineering department of the Bell Telephone Company of Pennsylvania, gave an interesting talk on cable multipling. The discussion which followed the address was participated in by a large number of those present.

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The Southern Bell Telephone and Telegraph Company.

According to official estimates the Southern Bell Telephone and Telegraph Company will earn a total of approximately $6,000,000 gross for the twelve months to end December 31. This will compare with about $5,200,000 in the year previous and some $4,600,000 in 1908. It is also calculated that the net surplus available for dividends will be around $1,200,000.

Special Telephone Rates in Louisiana.

The Railroad Commission of Louisiana has authorized the Cumberland Telephone and Telegraph Company to establish special rates as per schedule submitted.

Telephone Rates in Oklahoma.—The Supreme Court of the State of Oklahoma in a case involving the reasonableness of rates charged by the Pioneer Telephone and Telegraph Company holds that in valuing the property of a public service corporation such valuation should not be limited to the value of the physical tangible properties, but must include the value of the property as a "going concern."

Earnings of American Telephone and Telegraph Company.—The gross earnings of the American Telephone & Telegraph Company and associated holding and operating companies in the United States, not including connected independent or sublicense companies, for the eleven months ended November 30, 1910, were $150,244,013 an increase of $15,092,843; operating expenses $49,148,357, an increase of $4,580,106. The net earnings were $45,996,234, an increase of $2,074,248.

Alleged Illegal Sale of Bonds.—The report of Messrs. W. C. Handlan and James W. Ewing, receivers for the National Telephone Company at Wheeling, W. Va., shows that $670,000 of bonds of the corporation were sold by the Metropolitan Trust Company of New York, to satisfy a claim of $235,000. It is claimed that the bonds were sold at five per cent. of their face value for the benefit of the Continental Telephone and Telegraph Company, and that the holder of the bonds was not a bona fide purchaser thereof.

Spare Pair Society.—The regular monthly meeting of the Spare Pair Society, of Philadelphia, was held January 20, President H. C. Porter presiding. Mr. H. Mauraudian, of the engineering department of the Bell Telephone Company of Pennsylvania, delivered an able address on "Toll and Long Distance Telephone Transmission." Messrs. Williams and Wright, of the engineering department; Mr. Clegg, district engineer, and Messrs. Eldridge, Stoever, Jones, Stewart and Wuerst of the plant department participated in the discussion which followed.

Women Telephone Traffic Inspectors.—Miss A. J. Connelly, of Jamestown, N. Y., and Miss Lillian A. Vavasour, of Albany, N. Y., have been appointed telephone traffic inspectors by the Public Service Commission, Second District, New York. Both of these young women have had extended experience in telephone work and it will be their duty to enter the operating rooms of all telephone companies within the jurisdiction of the Commission, determine the faults that may exist, offering suggestions or corrections on the ground, and making a report of the same to the Commission.

Prof. D. C. Jackson to Appraise English Telephone Property.—Professor Dugald C. Jackson, of the Massachusetts Institute of Technology, Boston, Mass., and president of the American Institute of Electrical Engineers, has been retained by the British government to valuate the property of the telephone companies in that country which the government is to take over this year. Professor Jackson sailed for England January 18, for a preliminary consultation with the British post-office officials. A London dispatch states that English appraisers are criticising the government because it has ignored home interests in retaining Prof. Jackson.

Trial Telephone Service Illegal.—The New York Public Service Commission, Second District, has notified all telephone corporations within its jurisdiction that the practice of offering trial service installations is regarded by the Commission as unlawful, and that the company engaging in the same is subject to the forfeiture and penalties prescribed by the Public Service Commissions Law. It has been brought to the attention of the commission that certain telephone corporations have heretofore been in the habit of making what is called trial service installations and now it is desired that such installations be discontinued. Also that some corporations have been since September 1 and are now making such trial service installations, thus giving the new subscriber free service from a telephone corporation during a certain period of time, in many cases as long as six months.

High-Salaried Male Switchboard Operators.—Several large firms down town in New York have dispensed with women operators at their telephone switchboards and are employing high-salaried men to do the work. Among such houses it has come to be recognized that the task of dealing discreetly with the calls that come in so promiscuously over the wire is not a mere switchboard operator's duty. Rather, it demands a confidential person with such experience, such clear judgment, and so much ready diplomacy as is rarely possessed by young women.

It is stated that there are firms in the financial district who pay their operators $2,000 and $3,000 a year, and find that it pays the firms handsomely. Some particularly eminent concerns whose operations are of peculiar significance and delicacy pay even more. Such operators are virtually confidential private secretaries.

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Radio-Telegraphy.

Patents.—The following patents have been issued: No. 979,144. Transmission and Receipt of Electrical Energy, to R. A. Fessenden, Brant Rock, Mass.; No. 979,276. Space Telegraphy, to L. De Forest, New York, N. Y.

Powerful Wireless Waves.—It is stated that Professor Jacoviello of the University of Parma, Italy, has invented a method of transforming electric currents into Hertzian waves with little loss. This gives electromagnetic (wireless) waves of great power and increases the operating radius.

Wireless in Chile.—The Chilean government proposes to establish a powerful wireless telegraph station at Talcahuano, where the Chilean navy yards are located. The government has under contemplation the construction of several wireless stations along the coast, from Arica to

Ordered a Meal by Wireless.—A passenger on board of an Atlantic steamer sent an order from sea by wireless to a New York restaurant to have a meal ready for him on his arrival. The order was carried out faithfully and the man got his meal just as he had planned it.

Wireless Telegraph Association of Rhode Island.—At the annual meeting of the Wireless Telegraph Association of Rhode Island, held in Providence, January 11, Percy Williamson was elected president; Leo Murray, vice-president; I. Creaser, Jr., secretary, Leonard Thornton, treasurer.

Stopping Trains by Wireless.—It is stated that Mr. Frank W. Prentice, of Toronto, Ont., has invented a wireless brake-operating device for railway trains. The device has been practically tested at Ottawa, Ont., on the Canadian Pacific Railway and is reported to have worked satisfactorily.

Australian Wireless Stations for Sale.—The Marconi Wireless Telegraph Company has offered to sell to the State the wireless telegraph stations erected five years ago at Queenscliff (Victoria) and Devonport (Tasmania). The stations have been little used. It is the intention of the Marconi company to modernize the equipment and to erect a station on King Island.

New Form of Masts and Poles.—A German inventor has devised a new method of constructing collapsible masts and poles, suitable for wireless telegraph antennae, signal masts, etc. They are constructed of steel bands running lengthwise of the mast and transverse connecting members for holding the steel bands together to form a tubular structure. It is claimed that this form of construction gives a very strong and light structure. These masts may be made in the stationary or portable types.

Wireless in Russia.—The Russian Posts and Telegraphs Department is elaborating a project to establish wireless stations on the Tchukott peninsula to connect with Petropavlovsk and Nicolaieffsk; in Archangel for Solovietz and islands; in Reval for communication with ships sailing the Baltic; and, finally, at Taganrog for communication with vessels in that region. The wireless system is being extensively adopted in many other parts of Russia.

Continental Wireless.—Mr. C. L. Spear, reputed to have been the chief promoter of the Continental Wireless Telephone and Telegraph Company, New York, which was raided by the Post Office authorities, pleaded not guilty to an indictment charging him with using the mails in connection with a scheme to defraud investors in the company's stock. He was held in $7,500 bail.

More Wireless Stations in Alaska.—The Navy Department proposes to establish two new wireless stations on the southern coast of Alaska, one at Unalaska and the other at Kodiak. The collier Saturn will leave the Mare Island navy yard, San Francisco, on May 1, with the apparatus. The Navy Department also contemplates the erection of a wireless station on the Hawaiian Island of Oahu. An effort will then be made to establish wireless communication between Unalaska and the Hawaiian Islands.

Wireless for Canadian Steamers.—A law recently enacted at Ottawa provides that every seagoing and coasting passenger ship of over 400 tons gross tonnage registered in Canada, and every seagoing and coasting freight ship having a gross tonnage of over 1,200 tons, shall be equipped with apparatus for wireless telegraphy. Failure to comply with the law subjects the offending owner to a fine ranging from $100 to $1,000, or to a term of imprisonment not exceeding twelve months, or both.

Wireless Inventions on Exhibition.—Prof. Cerebotani, an Italian scientist, gave a private exhibition, in Paris, December 30, of his wireless inventions. Among the apparatus shown were a pocket wireless machine, a wireless telegraph printer by means of which messages are sent as readily as writing on a typewriter, and a wireless telautograph which enables persons to sign their signature as far as wireless waves reach. Another invention shown was a syntonizing device for wireless telegraphy.

Wire and Wireless Telegraphy and Telephony.—Dr. A. E. Kennelly of Harvard University, on January 13, delivered a lecture on Wire and Wireless Telegraphy and Telephony, before the Sigma Xi Honorary Society of the University of Pennsylvania, Philadelphia. The lecture was illustrated by lantern slides. Dr. Kennelly is a former telegraph man, and is one of the highest authorities in telegraph and cable matters. He is the author of several books on electrical subjects and is an interesting and entertaining writer on any subject.

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Mr. A. H. Ginman, operator of the Marconi wireless telegraph station at Siasconset, Mass., has been promoted to the construction department of the company. He will erect two new stations along the south Atlantic coast and one at Nassau, Bahamas. Mr. Ginman is succeeded at Siasconset by Mr. John Cowden.

Wireless Telegraphy Between Army Posts.—Powerful wireless telegraph stations have been installed at Fort Omaha, Neb., and Forts Leavenworth and Riley, Kan. The War Department has ordered the use of wireless telegraphy in place of line telegraphy hereafter between these posts. It is the purpose of the Department to extend wireless communication to other Western posts, so that they shall not be dependent upon wire service. Stations are being equipped at Cheyenne and Denver.

Wireless Communication from Aeroplane.

Lieutenant Paul W. Beck, of the United States Signal Service, on January 22, demonstrated the practicability of sending wireless messages from a scouting aeroplane. The biplane was equipped with a wireless sending instrument, and with a wire 100 feet long trailing from the car Lieut. Beck transmitted several messages to the wireless station on the aviation grounds, at San Francisco, from a height of 500 feet. They were received successfully. The airship was at times about two and a half miles from the field.

Wireless Telegraphy in Fiji Islands.—The Colonial Sugar Company, an English concern, is about to establish a system of wireless telegraphy at its mills in the Fiji Islands. The mills are situated on different islands, and some of them are hundreds of miles apart. The company's steamer *Fiona* is also to be fitted with wireless apparatus. When the installations are completed, communication will be maintained between all the company's properties, and will enable the *Fiona* to be advised by wireless at which island she is required to call.

Wireless Across the Pacific.

Navigators in the northern Pacific ocean where the route to Yokohama skirts the Aleutian Islands wish the United States Government would erect wireless stations on some of the outer islands by which messages could be relayed to Dutch Harbor on Unalaska and thence to the mainland. The range of wireless on the north Pacific, for some reason—perhaps its nearness to the magnetic circle—is much less than on the Atlantic or in the tropical part of the Southern Sea. As it is, ships are long out of hearing and seldom pick up the Japanese station at Otsuiski beyond 500 miles, while sometimes 300 is the limit at which the instruments will work.

Wireless Telegraphy in Italy.

In the presence of representatives of the Italian Ministry of War and the Ministry of Posts and Telegraphs direct wireless communication was recently established between Coltano, Italy, and stations in Ireland and Canada, and messages exchanged with the station at Massowa, in the East African Italian colony of Eritrea. A similar station to that of Coltano is to be constructed at or near Buenos Aires and direct communication thus established between Italy and Argentina. From Massowa wireless communication will be maintained with Magadisho, in Italian Somaliland.

Life Saved by a Wireless Prescription.—Captain A. N. McGray of the tramp steamer Henry Frasch was taken ill recently on his voyage from Sabine Pass, in the Gulf of Mexico, to Portland, Me. There being no surgeon on board he telegraphed by wireless to the physicians of the United States Naval Station at Dry Tortugas for a prescription. The message was caught by the steamer Merida, then a much greater distance away, and the doctor on board the Merida sent a prescription by wireless to the sick captain. Captain McGray thinks his life was saved by this wireless prescription. He was ill from ptomaine poisoning.

Wireless Stations in South America.—It is expected that the fifteen new wireless telegraph stations of the United States Wireless Company along the Amazon and Paraquay Rivers, Brazil, will be completed within twelve months. Experiments made on November 16 with the Rio de Janeiro station, on Copocabana beach, resulted in satisfactory communication with a vessel in the harbor of Buenos Aires, 1,000 miles south, with Amaraline, in Bahia, 750 miles north, and with two ocean steamers nearly 500 miles at sea. It is reported that the Government will authorize the Lloyd Brazileiro to enter into a traffic agreement with the government telegraph system whereby these stations will be allowed to take commercial messages. The station at Rio de Janeiro replaces a government station which was built by a German Company.

International Telegraph Union Memorial.—The Swiss Federal Council has issued a revised programme for a competition for the erection of a monument at Berne to commemorate the foundation of the International Telegraph Union. None of the designs submitted for the competition, which took place last year, met with the approval of the international jury appointed to consider them. The new competition is open to all artists in the world. The artists chosen for the purpose will be entrusted with the execution of the monument, at a cost not exceeding 170,000 francs. The jury will have at their disposal the sum of 20,000 francs, to reward deserving competitors. Models must be deposited at the Federal Palace, Berne, before August 15, 1911.

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The Railroad.

Telephone Dispatching on the Evansville & Terre Haute Railway.

The Evansville & Terre Haute Railway has recently equipped its main line from Evansville to Terre Haute, Ind., with a telephone train dispatching circuit, consisting of twenty-seven regular way stations, twenty-five siding telephones and twenty-five block telephone stations. The siding telephones have been placed on the block wire. It is possible by means of a system of repeating coils and switches to connect a branch telephone direct to the train wire in case it is found necessary for a train crew to talk to the dispatcher. An interesting feature of this installation is that the block telephone wires are simplexed for telegraph work, thus providing a local telegraph station for message work at each block office.

Lake Shore Railway's Telephone System.

From Buffalo straight through to Chicago the Lake Shore and Michigan Southern Railway is making use of the telephone method of controlling train movements. Its circuits now equipped consist in detail of the following: Buffalo to Erie, eighty-eight miles, twenty-one telephone stations; Erie to Cleveland, ninety-five miles, twenty-five stations; Buffalo to Erie (message circuit), eight-eight miles, twenty-one stations; Cleveland to Toledo, Sandusky Division, 110 miles, thirty-seven stations; Cleveland to Toledo, Norwalk Division, 116 miles, thirty-five stations; Toledo to Elkhart, Ind., Air Line Division, 133 miles, forty-four stations; Toledo to Elkhart, Old Line Division, 143 miles, thirty-five stations; Elkhart to Chicago, 101 miles, thirty-three stations. Ultimately there will be a branch for telephone dispatching from Elkhart to Grand Rapids, Mich. This will be operated in conjunction with both the Air Line and the Old Line dispatching circuits, using one in the daytime and the other at night.

The apparatus used by this road consists of Western Electric telephones and selectors, and a few details of the equipment are of the special design of Mr. W. W. Ryder, general superintendent of telegraph of the New York Central lines.

Railway Telephone System on Chesapeake and Ohio.

The Chesapeake and Ohio Railroad will soon be using the telephone method of controlling train movements from Fortress Monroe to Cincinnati, Ohio, a distance of nearly 1,000 miles. Since last March the telegraph has been supplanted for train dispatching over four of the most important divisions of this road. Two new divisions were recently equipped with telephones and have rendered service since December 24. The telephone system is now complete from Richmond to Cincinnati by the James River route. The system now in use comprises 545 miles with 154 way stations. When present plans are completed nine divisions will be equipped, with 992 miles and 248 telephone way stations. The new equipment will be installed on the main line between Clifton Forge and Charlottesville, between Charlottesville and Richmond and between Richmond and Fortress Monroe.

Telegraph Engineering Course of Study.

The International Correspondence Schools of Scranton, Pa., said to be the largest institution in the world conducting a system of education taught by mail, brings its course of instruction in the field of telegraphy to the attention of operators through the medium of an announcement printed on advertising page iv in this issue. It is not designed to teach telegraph operating, but to furnish operators, whether in the commercial or railway service, with the practical instruction necessary to fit them for advancement in their profession. The object of this course is to give students a thorough education in all branches of telegraphy, in order that they may be qualified to fill the highest positions in the profession, and to be competent to understand and apply improvements that are constantly being made.

The course is especially thorough in all details and the textbooks are remarkable for their excellence, comprehensiveness and clearness of statement, and fully cover the subject taught. No telegrapher who desires to fully master the technicalities of his profession, should hesitate to enroll himself as a student in the International Correspondence Schools.

The principles underlying all telegraph systems are so thoroughly explained and freely illustrated that an operator taking this course should be able to read new circuits, and with a little study, to readily understand their operation. The preliminary subjects give the progressive telegrapher a firm foundation upon which to base the more advanced work.

Many telegraphers are dissatisfied with the positions they hold, yet they do nothing to better them. They are simply dissatisfied and complain—that is all. What they should do is to study—educate themselves so as to be fit to hold superior positions. Promotion and recognition may not come as soon as one might expect it, but the one who is prepared by study and observation to perform the duties of a higher position, will eventually get it, and will be appreciated. There is much valuable time wasted, when it might be utilized by studying a properly arranged Course, such as the Telegraph Engineering Course of the International Correspondence Schools.

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The Turner Monument Fund.

Mr. Andrew Carnegie has signified his intention and deems it a privilege, of contributing $50 toward the Turner Monument Fund, which is growing steadily. There is much to be done, however, and it is suggested that a renewal of effort be made generally to attain the purpose of the movement as early as practicable.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, and of the Western Union Telegraph Company, has shown his interest in this movement by contributing $50 toward the fund.

The last acknowledgment included a contribution of $5 from Mr. George H. Corse, of Shanghai, China. Mr. Corse was identified with the telegraph and railroads in this country for a number of years and is now representing in Shanghai the Chicago, Milwaukee and Puget Sound Railway.

For the information of those who may not yet be familiar with the object of this movement we may state that it is to commemorate the sending of the first telegraphic train order. This historical event took place at Turner, N. Y., in the autumn of 1851, and the order was sent by Charles Minot, general superintendent of the Erie Railroad. The proposed monument will cost about $3,000, and to meet this expense subscriptions are invited from all railroad and telegraph men. The Association of Railway Telegraph Superintendents and the Old Time Telegraphers' and Historical Association have given the proposition their official indorsement and are heartily co-operating in the work of raising the necessary funds.

The following named gentlemen constitute the committee in charge of the Monument Fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds are deposited with the Washington Trust Company, New York, as soon as received.

The contributions received up to date are as follows: Previously acknowledged, $757.25; W. S. Fender, San Francisco, Cal., $10.00; E. C. Drawbaugh, Cumberland, Md., $1.00; J. H. Weaverling, Pittsburg, Pa., $1.00; M. H. Cahill, Pittsburg, Pa., $1.00; G. W. C. Day, Pittsburg, Pa. $.50; M. W. Ross, Butler, Pa., $.50; P. P. McGorlick, Butler, Pa., $.50; C. F. Wilson, Butler, Pa., $.50; J. C. Hagerty, Cincinnati, Ohio, $.50; B. G. Knowlton, Seymour, Ind., $.50; J. M. Haffinton, Seymour, Ind., $.50; R. J. Sanders, Seymour, Ind., $.50; V. L. Childs, Seymour, Ind., $.50; G. V. Copeland, Seymour, Ind., $.50; S. W. Baker, Seymour, Ind., $.50; B. W. Parker, Seymour, Ind., $.50; T. C. Clifford, Jersey City, N. J., $5.00; Charles A. Harris, Jersey City, N. J., $1.00; John Casey, Middletown, N. Y., $.50; William A. Van Tassell, Middletown, N. Y., $.50; M. O'Brien, Middletown, N. Y., $1.00; H. R. Laughlin, Grafton, W. Va., $1.00; J. T. Dorsey, Grafton, W. Va.; $1.00; J. T. Staples, Grafton, W. Va., $1.00; A. P. Lavelle, Grafton, W. Va., $1.00; E. D. Griffin, Grafton, W. Va., $1.00; W. G. Robey, Grafton, W. Va., $1.00; J. F. Fordyce, Grafton, W. Va., $1.00; J. P. Dorsey, Grafton, W. Va., $1.00; P. Judge, Grafton, W. Va., $1.00; M. F. Greene, Grafton, W. Va., $1.00; A. Dwight Smith, Montreal, Can., $5.00; U. N. Bethell, New York, $10.00; J. F. Maquire, South Bethlehem, Pa., $5.00; G. J. Gildroy, Hazleton, Pa., $2.00; C. T. O'Neal, Buffalo, N. Y., $1.00; C. J. Shea, Wilkes-Barre, Pa., $1.00; J. N. Haines, and Sayre Dispatcher's office, Sayre, Pa., $2.00; J. F. Caskey, South Bethlehem, Pa., $3.00; T. H. Pindell, Bethlehem, Pa., $1.00; F. E. Schall, South Bethlehem, Pa., $1.00; J. F. Andrews, Newark, N. J., $1.00; F. A. Breisch, Hazleton, Pa., $1.00; Bert Hayden, Sayre, Pa., $1.00; G. R. Lewis, Auburn, N. Y., $.50; F. J. McCauley, Auburn, N. Y., $.50; A. C. Kerrick, Cortland, N. Y., $.50; M. C. Meservey, Cortland, N. Y., $.50; T. B. Smith, Auburn, N. Y., $.50; L. M. McGraw, Auburn, N. Y., $.50; H. D. Bartholomew, Newark, Ohio, $.50; E. E. Baird, Newark, Ohio, $.50; G. R. Keniball, Newark, Ohio, $.50; H. S. Leslie, Newark, Ohio, $.50; J. T. Mendenhall, Newark, Ohio, $.50; E. H. Conner, Newark, Ohio, $.50; L. L. Kerr, Newark, Ohio, $50; Theo. N. Vail, New York, $50.00; Charles Selden, Baltimore, Md., $2.00. Total, $888.25.

The treasurer of the fund holds a certificate signed by the assistant secretary of the Washington Trust Company, New York, Mr. George W. Toerge, to the effect that on January 24 the trust company had on deposit on account of the fund, $736.94.

Next Meeting of Old Time Telegraphers.—The next meeting of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps will be held at Atlantic City, N. J., September 7, 8 and 9. The hotel headquarters have not yet been selected.

Telegraph Tolls to Alaska.—The Seattle Chamber of Commerce has requested United States Senator Samuel H. Piles to urge upon the government immediate consideration of a substantial reduction in telegraph tolls between Seattle and Alaska, on the grounds that the present tariff between Seattle and Alaskan points is exorbitantly high and works a hardship upon the commercial interests of this territory and in the North.

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Annual Meeting of Gold and Stock Life Insurance Association.

The thirty-third annual meeting of the Gold and Stock Life Insurance Association was held in New York, January 16. Mr. George W. E. Atkins, president, in his report, stated that the little band, who first proposed a monthly payment of life insurance to temporarily take the place of the income of the deceased breadwinner, and thus enable, in many instances, the widow and orphan to adjust themselves to the changed conditions of life, "Builded better than they knew." Their good work, which has grown with the years, has indeed yielded abundant fruit, and the $139,000, paid in $50 monthly installments into over 240 homes, has surely been as a bond of sympathy and of hope, appealing to all who are eligible to seek the protection which the Gold and Stock Life Insurance Association offers. He therefore again urged the members to exert themselves in making known the merits and advantages of membership in the association, and to solicit applications to the end that the association may be enabled to permanently continue its useful and beneficent mission.

The old board of officers was re-elected as follows: George W. E. Atkins, president; Gardiner Irving, vice-president; W. J. Dealy, secretary; Lewis Dresdner, treasurer; executive committee, G. W. E. Atkins, Gardiner Irving, Herbert Smith, Lewis Dresdner, W. J. Dealy, Michael Breslin, Charles Shirley, T. A. McCammon and Albert J. Driver. Auditing committee, M. J. O'Leary, F. J. Nurnberg and J. J. Frederick.

Telegraphers' Mutual Benefit Association Annual Report.—The proceedings of the forty-fourth annual meeting of the Telegraphers' Mutual Benefit Association, held November 16, 1910, have been issued in pamphlet form, and copies are being distributed among the members. The report gives a very complete analysis of the work of the association, and it should be carefully studied by every member. President Brooks' suggestion that steps be taken to extend the operations of the association into the telephone ranks should be taken up vigorously by each member. The report covers thirty-two pages, and is gotten up in a very neat manner.

Advisory Board of Telegraphers' Mutual Benefit Association.

The following named gentlemen have been elected as an Advisory Board to act in conjunction with the Executive Committee of the Telegraphers' Mutual Benefit Association: B. E. Sunny, president Chicago Telephone Company, Chicago; H. J. Pettengill, president Southwestern Telephone and Telegraph Company, Dallas, Tex.; J. N. Keller, president New England Telephone and Telegraph Company, Boston, Mass.; W. T. Gentry, president Southern Bell Telephone and Telegraph Company, Atlanta, Ga., A. L. Salt, general purchasing agent Western Electric Company, New York; G. E. Paine, general superintendent Postal Telegraph-Cable Company, Chicago; H. C. Worthen, general superintendent Western Union Telegraph Company, Atlanta, Ga.; G. H. Usher, general superintendent Postal Telegraph-Cable Company, Atlanta, Ga.; C. H. Gaunt, general superintendent Western Union Telegraph Company, San Francisco, Cal.; J. G. Blake, general superintendent Postal Telegraph-Cable Company, San Francisco, Cal., and J. C. Nelson, general superintendent Western Union Telegraph Company, Denver, Col.

Combination of 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. The new company will have control of the Telefunken and Braun patents through the participation of the Allgemeine and Siemens & Halske electrical companies.

An arrangement has been effected with the Marconi Wireless Telegraph Company, whereby 110 stations on board the North German Lloyd, Hamburg-American and other German steamships, which heretofore have been operated jointly by the Marconi and the Telefunken companies, will be wholly in the hands of the new company. The company expects soon to have 150 German vessels supplied with its stations. As the Belgian company owns Marconi rights, the new organization acquires the right to use that system generally, thus ending a long standing rivalry between the Marconi and German interests.

Mr. C. E. Jones, manager of the Western Union Telegraph Company, Zanesville, Ohio, has been in the service of the company for twenty-four years. At the age of sixteen, he began his telegraph career at Waverly, Ohio, in 1886, and worked successively at Ashland, Ky., Cattlettsburg, Ky., and Portsmouth, Ohio, going to Zanesville in 1903, as manager. Mr. Jones is held in high esteem in Zanesville, and a few days ago, on the occasion of his entering his twenty-fifth year of service, a local paper printed an interesting account of his career.

Mr. T. F. Clohesey, a well-known old time telegrapher now located in Buffalo in other business, in renewing his subscription, writes: "I subscribe for quite a number of periodicals, etc., but I look forward with more interest to the arrival of Telegraph and Telephone Age than to all the others together, because I know there is something in every issue to call up pleasant memories of the past."

The Nantucket Shoals lightship which has been overhauled, has been equipped with a new wireless telegraph outfit, and returned to her anchorage off the Massachusetts coast. Two wireless operators are included in the crew.

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Obituary.

Duane D. Stilwell, a telegrapher, aged 73 years, died at La Grange, Ind., December 23.

Dwight M. Bowers, died at Syracuse, N. Y., on December 27, at the age of 65.

Orrin B. Ocker, an operator in the Kansas City, Mo., Western Union Telegraph office, died on December 29, from the effects of injuries received in a railroad accident two days prior. He was 37 years of age.

William F. Butler, a telegrapher at Rochester, N. Y., died in that city December 19, aged 54 years.

Albert C. Adair, for thirty-six years manager of the Western Union Telegraph office at Paris, Ky., died December 8, aged 53 years. He was city clerk of Paris for many years and held that position at the time of his death.

Frank Books, of Louisville, Ky., a telegrapher, died in that city December 12, aged 42 years. Mr. Books was formerly night manager of the Postal Telegraph-Cable Company's Louisville office, and had been in the company's service for many years.

William H. Stevens, formerly and for many years night chief operator of the Western Union Telegraph Company, Buffalo, N. Y., died on January 14, at the age of 66 years. He was at one time in the newspaper business and later became ticket agent in Buffalo for the Grand Trunk Railroad, but for the past thirty-five years in the service of the Western Union Telegraph Company, holding many important local positions. On New Year's day he was presented with a loving cup by the Western Union employes. He is survived by his wife, a son and a daughter.

Charles C. Boyd, aged 40 years, night chief of the Western Union Telegraph Company at Columbia, S. C., died on January 10. Mr. Boyd was well liked by all who knew him, especially by the newspaper fraternity, to whom he rendered much valuable service. He is survived by his wife and five children.

Charles T. Beery, aged 35 years, an operator for the Western Union Telegraph Company at Kansas City, Mo., died recently.

The Late E. B. Havis.—Mr. Frank P. Foster, Corning, N. Y., former secretary of the International Association of Municipal Electricians, writes feelingly regarding the death of E. B. Havis at Birmingham, Ala., which was noted in these columns December 16 last. Mr. Foster states that his first telegraph work was the carrying of messages for the Western Union Telegraph Company at Birmingham, under Mr. Havis, who was identified with the company at that time. He naturally associated Mr. Havis with his progress and experiences in telegraphy, and was greatly shocked on learning of that gentleman's death.

Operator Frozen to Death in British Columbia.—Eugene W. Snodgrass, an operator at Hazelton, British Columbia, died alone in a Canadian forest during a blizzard last December. The hardships endured by men who spend their lives in the desolate places of earth for the benefit of their fellow men can hardly be realized by those who enjoy the advantages and comforts of civilization. Young Snodgrass started out to repair the telegraph line on December 11 and, although he failed to report, it was thought that he had reached the test camp ten miles away. When his faithful dog reached the camp without his master a search for him was immediately started. The tracks in the snow, which was four feet deep, showed that Mr. Snodgrass had wandered fourteen miles in the storm. The frozen body was found under a tree. The searchers were guided by the dog's tracks in the snow, which led directly to where the body lay. Travel in that region is difficult at this time of the year, and as the body can not be sent to the former home of the deceased before April it was buried in Hazleton by the Order of Eagles, the Canadian government paying the expenses. Mr. Snodgrass was twenty-two years of age, being born at Council Bluffs, Iowa, where his mother still resides. He was married three years ago and his wife survives him.

About seventy-five messengers of the American District Telegraph Company attended the Child Welfare Exhibit at the Seventy-first Regiment Armory, New York, on the evening of January 25. They were the guests of the company on this occasion.

Magnetic Club Election.

At the annual meeting of the Magnetic Club, held January 12, the following officers were elected for the ensuing year: President, Charles P. Bruch; first vice-president, Marston R. Cockey; second vice-president, Bertram M. Downs; third vice-president, Theodore L. Cuyler, Jr.; fourth vice-president, Edward B. Pillsbury; secretary, William B. Dunn; treasurer, Joseph J. Cardona. Governors until January 10, 1913, Messrs. Frank E. McKiernan, Charles Shirley, Leona Lemon, Daniel F. Mallen.

The following gentlemen were elected members of the Board of Governors at a previous annual meeting for the term expiring January 11, 1912; Messrs. John J. Whalen, Eugene P. Tully, Isaac Smith, Christopher F. Leonard.

The officers and members of the Magnetic Club were entertained by the officers and members of the First Company, Signal Corps, National Guard, New York, Wednesday evening, January 11, on the occasion of a review of the company by Colonel Frederick T. Leigh, chief signal officer, State of New York, and his staff, in the armory at Thirty-fourth Street and Fourth Avenue, New York. After the close of the review, and the inspection of the armory, a reception was held and supper was served. At the annual meeting of the Magnetic Club, held the day following, a resolution was adopted expressing appreciation of the high compliment paid the club by the Signal Corps and thanking the corps for its courtesy.

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Philadelphia Electrical Aid Society.—The twenty-third annual meeting of the Electrical Aid Society of Philadelphia was held January 10. The following officers were elected for 1911: President, William R. Harmstad; vice-president, A. G. Strickland; recording secretary, W. E. Vanarsdall; financial secretary, R. C. Murray; treasurer, James H. Wilson. Executive Committee—The officers and Frank E. Maize, Andrew S. Weir, Mary McFadden, Nellie F. Hayes, George J. Wells, C. H. Beckworth. Trustees—George J. Wells, R. H. Conway, M. N. Redding. One hundred and sixty-six members were admitted during the year. The membership December 31, 1910, was 937. Receipts for the year were $5,282.42. Disbursements: Sick benefits, $3,029; death benefits, $600; expenses, $880.15; total, $4,509.15. Amount in bank and saving funds, $7,116.04. After the meeting sixty-five members were admitted, making the total 1,002. After adjournment there was a banquet, followed by a dance.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, POSTAL.

Recent visitors to this office were President Clarence H. Mackay, General Superintendent E. B. Pillsbury and Division Superintendent L. Lemon.

Miss Catherine M. Graham has resigned to become a trained nurse. Miss Graham was very popular in the office, and gave a farewell party to friends at her home in Bryn Mawr on January 26. The office was well represented and the occasion was one that will not be soon forgotten.

CLEVELAND, WESTERN UNION.

Mr. M. D. Combs, traffic chief, has been promoted to be chief operator, and Mr. T. H. Baker has become assistant chief operator. Mr. J. E. Wertman has been appointed district wire chief with headquarters at Cleveland; Mr. A. G. Spiller has been advanced to be plant chief and Mr. W. E. Gales wire chief.

CLEVELAND, POSTAL.

Mr. Fenton T. Bott has resumed his former position as manager of the Dayton office, succeeding Mr. George M. Purdy, who has been transferred to the managership of the Cleveland office, as previously announced in these columns. When Mr. Purdy assumed his new position, he found a broken organization. Manager B. J. Ross, his assistant Mr. J. A. Paskert and chief delivery clerk Mr. M. A. McGrath, had packed up their baggage and moved to the Western Union headquarters. Affairs are righting themselves, however, under Mr. Purdy's guidance and the Postal company's interests are starting out on a new era of prosperity. Mr. E. F. Fahrendorf, formerly branch manager at Cincinnati, and later cashier and assistant manager at that point, succeeded J. A. Paskert as assistant manager. Mr. J. J. Hayes, formerly assistant cashier, has been appointed cashier and Mr. Nathan Gerson has succeeded Mr. M. A. McGrath as chief delivery clerk at Cleveland. Mr. Howard Simon, formerly messenger at Findlay, Ohio, has succeeded Mr. P. M. Grebe as manager. Mr. A. E. Jenkins, formerly manager at Wapakoneta, Ohio, has succeeded Mr. E. C. Snell as manager at Ashtabula Harbor, Ohio, and Mr. Ralph Cowles, formerly messenger at Lima, Ohio, has succeeded Mr. Jenkins as manager at Wapakoneta, Ohio. Miss D. M. Beckstead, manager of the Newark, Ohio, office, having won a trip abroad through her popularity vote, started on her tour January 1. Her position is being filled, until her return, by Miss M. Winifred Evans, manager of the Warren, Ohio, office, and Mr. Frank Schweinfurth, operator in the Cleveland office, is filling Miss Evans' place at Warren, until her return from Newark.

LOS ANGELES, WESTERN UNION.

A. L. Fish has been transferred from San Francisco printer department to this city, having charge here of the printer department, vice Mr. C. J. Covher transferred to the all-night traffic chief operatorship. W. B. Patterson has been appointed assistant wire chief days, and Mr. T. J. McDonald night wire chief.

NEW YORK, WESTERN UNION

Onnolee Lodge, order of Iroquois, New York, which is composed mainly of telegraphers, held its annual meeting January 12, and elected the following officers: president, P. Varian; past president, M. H. Crane; vice-president, John J. O'Brien; secretary, Maxwell Green; treasurer, A. M. Lewis; collector, E. C. Rafford; trustees, Gardiner Irving, William Rath, J. Heidemark.

Mr. James Tompkins, employed in this department many years ago, and a telegrapher of exceptional ability, died at Ogdensburg, N. Y. on January 16.

A direct circuit to Seattle, Wash., was inaugurated January 19. This is the longest telegraph circuit worked out of New York.

Mr. Charles Thom of the quadruplex department, who has been giving lectures for the Electrical School class, has been obliged to relinquish this work on account of ill-health. Mr. Thom's lectures have been very helpful and greatly appreciated, and general regret is expressed at his having to give up the work.

NO APOLOGY NEEDED after a "Central Rebuilt" typewriter is delivered. Remington, Smith-Premier, Underwood, L. C. Smith, Royal and all makes—high in quality, low in price. Postal employes may purchase at 75 cents weekly. Central Typewriter Exchange, 203 Broadway, New York. D. A. Mahoney, Representative.

Telegraphers' Mutual Benefit Association.

Assessment No. 519 has been levied by the Telegraphers' Mutual Benefit Association, to meet the claims arising from the deaths of Benj. F. Dillon at Atlanta, Ga. John F. Noonan at Paterson, N. J., Morris J. Kern, at San Francisco, Cal., Will-

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iam Brennan at Philadelphia, Pa., Martin Adams at Chicago, Ill., William K. Bennett at Houston, Tex.

Morse Electric Club Dinner.—Active preparations are being made for the Morse Electric Club dinner which is to be held at the Savoy Hotel, New York, February 23, and there is every indication that there will be a large attendance. An excellent programme of entertainment is being prepared. Mr. Frank J. Scherrer, 30 Church Street, New York, is the secretary of the club.

A Brave Lot of Operators.—During the recent fire in the Chamber of Commerce building in Cincinnati, Ohio, the operators in the Western Union Telegraph office, which adjoined the burning building, stuck to their posts although the room was filled with smoke and sparks. Night manager Conley and assistant manager Herman made preparations for a hasty exit for the force in case of necessity, and told the men that they were at liberty to leave if they felt themselves in danger, but not a man deserted his key. Business was not interrupted by the fire.

Mr. C. F. Annett, Jr., son of Mr. C. F. Annett, an old-time telegrapher, now of Jerome, Idaho, distinguished himself recently in bringing relief to a disabled passenger train on the Pacific, Idaho and Northern Railway, when other means had failed. Each train carries an emergency composite telephone set, but in this instance it failed to work. Mr. C. F. Annett, Jr., plant foreman of the Weiser, Idaho, telephone exchange, was a passenger on the train, and having with him a test set and repair tools, he climbed a pole and sent a message to Midvale calling for a relief engine to take the place of the one which had broken down. Annett the younger is one of the youngest veterans of the Spanish-American war, and was with the Sampson fleet during its operations in Cuba, on the battleship *Oregon*.

Booster Railway Telephone Circuit.—The Kellogg Switchboard and Supply Company's special "booster" railway telephone circuit is now in operation on a great many lines handling train movements, and is used on railway telephone message circuits. No additional batteries are required, yet twenty-five stations can be spoken to at any time without detriment to transmission. With the Kellogg transmitter the voice is clear and strong, regardless of the number of stations that may be in with operators listening. It is stated that the Kellogg circuit arrangement increases the transmission efficiency from twenty-five to 100 per cent.

Non-Multiple Toll Switchboards.—The Western Electric Company has just issued bulletin No. 1006, describing non-multiple toll switchboards. The apparatus is recommended for use as toll boards in either magneto or central battery exchanges, and for use also as magneto exchange switchboards where a desk type board is desired or a switchboard with a lower key-shelf than is ordinarily provided on local boards.

Telegraph and Telephone Age is in a position to furnish its readers with any information that they may desire pertaining to electrical matters, also any book that is published on telegraph, telephone or any other electrical subject. Prompt attention is given to all inquiries, orders, etc.

Mr. C. A. Johnson of the Postal Telegraph-Cable Company at Meadville, Pa., in renewing his subscription for another year, writes: "Glad you did it, the Telegraph and Telephone Age is the only thing I like to write a check for."

WANTED.—Live agents in all large Western Union and Postal offices to represent us. Central Typewriter Exchange, New York.

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.

There is much for telegraph operators to learn respecting their calling which can be readily obtained by reading Telegraph and Telephone Age—$2 a year.

MARTIN'S LATEST VIBROPLEX, $9.00. Address James B. Havice, General Agent, 253 Broadway, New York.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

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.

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Telegraph and Telephone Age

No. 4. NEW YORK, FEBRUARY 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY — XII.

A Study of Telegraph Apparatus.

BY WILLIS H. JONES.

THE RHEOSTAT.

The word rheostat refers to all devices which contain adjustable resistance material intended to be inserted in an electric circuit for the purpose of regulating the voltage therein. The material may consist of water, gas, metal, or any other substance that can be utilized in a practical manner. In telegraph service, however, rheostats almost universally consist of a number of coils of fine insulated German silver wire any of which may be cut in or out of circuit by means of metal plugs.

If we should stop with this conventional definition of a rheostat the reader would probably say, "Well, I don't learn anything new from that. Every operator certainly knows that much about it." But right here is where the study begins. If an operator without further enlightenment attempted to construct a rheostat for a multiple circuit, for example, he would probably learn too late that it would not answer the purpose in every respect.

The mistake that possibly nine out of every ten operators would make would be in the manner they wound the coils and the selection of material for the core. Each coil would probably be wound in series around an iron spindle or core after the manner of a relay, with the result that when used as an "artificial line" on a multiplex circuit, the artificial line would have a static discharge as great or greater than the main line itself It is obvious, therefore, that this method cannot be followed.

Now the first thing to consider in the construction of a rheostat is the elimination of everything that tends to create a magnetic field. Iron of course is the worst material to use, hence it is never used and the coils are wound around wooden spindles, or some other non-magnetic material.

Again, a magnetic field will be created and a counter-electromotive force developed in the coils if the current is allowed to flow in parallel chan-

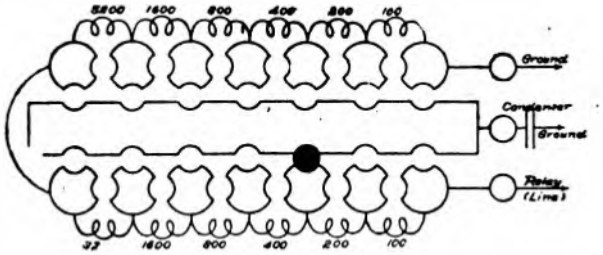

FIG. 1.—DIAGRAM OF CONNECTIONS OF RHEOSTAT COILS.

nels, such as is the case between the various convolutions of the ordinary series-wound coils. If, however, the convolutions are so arranged that the current flows in opposite directions through any two adjacent wires, the current in one wire neutralizes the magnetic effect of the other and no magnetic field is developed. Hence with these two precautions taken the multiplex rheostat is non-inductive. The detached portion of the accompanying diagram shows how the wire should be wound.

After the necessary length of wire required for a given number of ohms is ascertained, place the two ends together and make a double strand of it, but do not cut the wire in the middle where it doubles back. It will then become a long loop. Then, beginning with the loop or closed end, wind the two wires thus doubled as though they were a single strand. When it is all wound the two terminals of the coil will be ready for connection with the two separate brass disks just over the coil as shown in the diagram. By means of this method of winding it will be readily seen that the current in each strand and each double turn of wire must necessarily flow in opposite directions, which is the object of the winding.

The two terminals of the wire are attached to separate disks in order that when a metal peg is inserted in one of the holes shown in the illustra-

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tion, a coil may be cut out and the amount of resistance that particular coil measures eliminated.

The brass bar placed between the two rows of coil disks (Fig. 1) forms the terminal connection for one plate of the condenser as shown. It has no connection whatever with the artificial or the main line multiplex circuit in the way of being a branch circuit, except to absorb a charge of electricity from the current flowing through the artificial line. The condenser being open, the current cannot flow through it, hence, although the artificial line is actually tapped and connected to the condenser at about the third hole in the rheostat it does not create a leak as a grounded branch circuit would. This tap often perplexes inexperienced students and the explanation should be noted. The amount of retarding resistance the condenser must discharge through depends upon the position of the peg connecting it with the artificial line. As a rule this connection is made at the third hole, which inserts four hundred to six hundred ohms resistance.

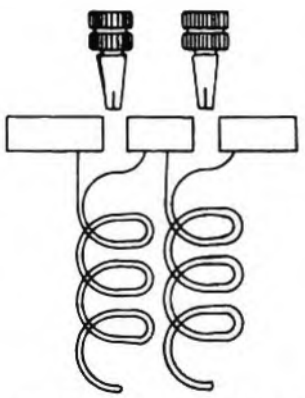

FIG. 2.—DETAILS OF COILS AND PLUGS.

(To be continued.)

Recent Telegraph and Telephone Patents.

ISSUED JANUARY 17.

981,845. Telegraphy. To P. B. Delany, South Orange, N. J.

981,997. Signal Telegraph. To A. Goldstein, New York, N. Y.

982,209. Bridging Telephone System. To H. F. Joeckel, Camp Point, Ill.

982,213. Telephone Switch Apparatus. To S. A. Koltonski, Boston, Mass.

ISSUED JANUARY 24.

982,274, 982,275 and 982,276. Printing Telegraph. To C. K. Jones, Kansas City, Mo.

982,450. Telephonic Instrument. To S. L. Van Akin, Jr., Syracuse, N. Y.

982,546. Lock-out Party Line Telephone System. To A. Swenson, Willmar, Minn.

982,638. Telegraphic Dot Transmitter. To H. H. Smith, Brooklyn, N. Y.

982,641. Telephone Mouthpiece. To L. Steinberger, New York.

982,659. System of Telegraphy. To R. L. Dean, Kansas City, Mo.

983,098. Telephone System. To F. C. Unger, St. Louis, Mo.

983,240. Telegraph System. To I. Kitsee, Philadelphia.

Personal.

Colonel Robert C. Clowry, former president of the Western Union Telegraph Company, accompanied by his secretary, Mr. F. J. Scherrer, left on February 6 for a few weeks' trip to the South, where they will visit Tampa, Fla., Palm Beach, Fla., Nassau, Bahamas, and other points.

Mr. Thomas A. Edison has gone to Fort Wayne, Fla., to spend his usual winter vacation.

Hon. David P. de Villiers Graaff, Minister of Public Works, Posts and Telegraphs of the Union of South Africa has been made a baronet by King George of England.

Major General A. W. Greely, U. S. A., retired, in a recent address before the District Society of the Sons of the Revolution, Washington, D. C., described the work of the army in connection with the laying of the cable and the operation of the wireless telegraph system in Alaska.

Mr. Andrew P. Sell, the well known telegrapher of Philadelphia, is the author of an interesting contribution which appeared in the Philadelphia *North American* of December 25, 1910, under the heading "Joys and Jars of the Christmas Messenger."

Mr. F. E. Camp, inspector of the Canadian Pacific Railway Company's Telegraphs, Revelstoke, B. C., son of Mr. and Mrs. W. J. Camp, of Montreal, spent a vacation with his parents recently in the latter city.

Mr. H. B. Perham, president of the Order of Railway Telegraphers, was a recent New York visitor. The next convention of the order will be held in Toronto, Ont., in May.

Mr. Walter C. Burton, the well known former telegrapher of New York, and at one time a state senator from Brooklyn, was honored on February 7 by an appointment as a Civil Service Commissioner by Governor Dix. Mr. Burton's nomination was confirmed at once by the Senate for the reason that he was a former member of that body and needed no further investigation.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Charles C. Adams, second vice-president of the company, accompanied by Mr. F. F. Norton, superintendent of traffic, New York, was in Chicago, on company business this week.

Mr. E. B. Pillsbury, general superintendent; Mr. C. P. Bruch, third vice-president; Mr. M. M. Davis, electrical engineer, and Mr. J. P. O'Donohue, division electrical engineer, were in Buffalo recently on company business.

Mr. Thomas F. Burke, of the Jersey City office of this company, has been appointed manager of

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the Poughkeepsie, N. Y., office, vice F. W. Towne, who is to enter the brokerage business.

Mr. E. L. Kearney has been appointed assistant manager of the Pittsburg office. Mr. Kearney was born in that city, February 26, 1873, and began his telegraphic career as messenger for the Mutual Union Telegraph Company in 1886. He entered the service of the Postal Telegraph-Cable Company as messenger in 1888, and afterward filled various positions until 1904, when he resigned to engage in other business. He returned to this company in 1907 and had charge of the branch office in the financial district until his recent promotion.

Mr. J. F. Horn, formerly manager at Zanesville, O., has succeeded Mr. M. G. Mullins as manager at Canton, O.

Mr. D. Pemberton, formerly operator at Lima, O., succeeds Mr. K. P. Huff as manager at Middletown, O.

Mr. Glenn L. Pierce, manager of the Evansville, Ind., office of the Postal Telegraph-Cable Company, was born at Alexander, N. Y., January 10, 1887. He began his telegraphic career in May, 1904, as manager of the Harvey, Ill., office of the same company. He has filled positions as operator at St. Louis, Mo., and Quincy, Ill., and as manager at Hannibal, Mo. He was appointed to his present position, January 1, 1909.

A newly opened office has been established at Hazleton, Pa. Mr. James C. McGeehan has been appointed manager.

This company has secured the right of way for its line along the Santa Fe system throughout Texas and is extending its lines in that state. Mr. C. M. Baker, division superintendent of plant of the Western division at Chicago, has the work in hand.

New Postal Office in Buffalo.

The growth of the Postal Telegraph-Cable Company's business in Buffalo, N. Y., has made it necessary for that company to enlarge and improve its equipment and facilities in that city. A lease has just been signed for a long term of years with the Prudential Building Company, in Buffalo, under which the Postal Company will occupy the room vacated by the Columbia Bank, at the corner of Pearl and Church Streets, as a receiving office, and will have ample space on the second story for its operating and accounting departments. Arrangements are now being made for re-fitting the quarters, and the work of installing fixtures and equipment will be started at once. When finished the receiving room will probably be the handsomest and most attractive of its kind in the United States.

The operating department will be fitted out with new and up-to-date apparatus and will be arranged with a view to facilitating the handling of business and to assure the comfort of employes to the utmost extent.

The moving of a telegraph office of the size of that in Buffalo is a vast undertaking. In this instance it will involve months of time and an expenditure of $30,000 or $40,000. It will probably be a year before the new office is ready for occupancy, although the work will, in the meantime, be pushed as rapidly as conditions will permit.

Buffalo is one of the most important points in this company's service and will become still more so as the business continues to expand. It is what is known as a repeating and distributing point. A large number of the most important circuits between the East and West are operated through this office, and the local business is large.

Postal Office in Pennsylvania Terminal, New York.

The Postal Telegraph-Cable Company's new office in the Pennsylvania Terminal, New York, is striking for its simplicity and elegance.

The office is located in a prominent position on the main waiting room floor, opposite the railroad company's ticket office. It is a room about ten or twelve feet square, and it is fitted out in the simplest manner possible. Not a scrap of unnecessary paper is visible anywhere, and absolute order and cleanliness are strictly enforced by the railroad company's rules.

Around two sides of the room is a counter of solid mahogany, highly polished and 1½ inches thick. On this are set four sounder resonators, two relays and four keys, also the outlet of a pneumatic tube which connects with the Pullman ticket office across the waiting room. These are the only things visible on the counter. Under the counter are several steel closets for supplies, etc., the switchboard being contained in one of these.

The switchboard consists of ten jacks and four wedges, ten wires running into the office. Not a wire is visible to any one inside of the office or outside. The resonators used are of the company's latest improved form, and are constructed of material to harmonize with the general surroundings. They are screwed to the desk, the long arm supporting the resonator being movable in a socket.

The office is lighted by four Nernst lamps suspended from the ceiling, which give a soft well-diffused light.

Each member of the force wears a regulation Pennsylvania Railroad uniform with the word "Postal" on the collar, this being one of the railroad company's requirements.

The office is always open, there being three shifts of operators, only one being on duty at a time, however. In a recess near the office door is a long counter of heavy plate glass provided for patrons on which to write their telegrams. The counter is lighted at night by electric lights placed in long shades and all of the fittings are of solid brass.

To look into the office one would never suspect that it was a busy place, everything is so

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scrupulously clean and orderly. Mr. J. Sheffery is manager of the office.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager of this company is on a trip of inspection throughout the west and southwest. He will visit Buffalo, Cleveland, Detroit, Chicago, St. Louis and Kansas City and will return to New York February 20. He is accompanied by his secretary, Mr. W. C. Merly.

Mr. E. Y. Gallaher, auditor of the company, was married on February 2, to Miss Isabelle Moore, of New York. The couple will be absent on their honeymoon until March.

Mr. Frederick W. Lienau has been appointed assistant secretary of this company. Mr. Lienau is a native of New Jersey and studied law at Columbia College and the New York Law School, graduating from the latter. He entered the legal department of the company in 1903 and in 1906 was attached to the general manager's office.

Mr. C. H. Gaunt, general superintendent of the company at San Francisco, who has been confined to his home for some time past with typhoid fever, is reported convalescent.

Mr. J. G. Hilbert, has been appointed division superintendent of construction of the Gulf Division of this company with headquarters at Dallas, Tex.

Mr. C. A. Rhoades, of New York, has been appointed division auditor of the Mountain Division with headquarters at Denver, Col.

Mr. J. J. Hoefman has been appointed division auditor of the Southern Division with headquarters at Atlanta, Ga.

It has been arranged to bring under one responsible control in the person of Mr. S. M. Williams, who will be in charge with the title of manager, the various services at present rendered under the designation Commercial News Department and Gold and Stock. The department will continue to be known as the Commercial News Department. Superintendent Mr. W. J. Dealy of the Commercial News Department will continue in his present position with the title of general superintendent. Mr. George B. Scott will continue as superintendent of the Gold and Stock branch of the service in New York City, reporting to Mr. Williams.

Mr. Jacob Levin, formerly general superintendent of the Southern Division of the Western Union Telegraph Company at Atlanta, Ga., was a recent New York visitor.

Mr. E. B. Saylor, formerly superintendent of this company at Pittsburg, Pa., has been appointed to a position in the office of the general manager, New York.

Mr. W. H. Mathews has been transferred from the complaint bureau to the general manager's office. He has been succeeded in the complaint bureau by Mr. G. W. Blanchard.

Mr. Albert J. Lister has accepted a position with this company as cable solicitor with headquarters at the Central Cable office, New York. Mr. Lister was formerly in the service of the Commercial Cable Company and has a wide experience in the cable service.

Mr. L. F. Taylor has been appointed to a position in the office of Mr. H. J. Kinnucan, district commercial superintendent, Detroit, Mich.

Mr. W. T. O'Neal, of Washington, D. C., has been appointed manager of the Alexandria, Va., office, vice Mr. R. L. Stultz, resigned.

Mr. G. T. White has been appointed manager of the Wilmington, N. C. office, vice Mr. E. T. Moore, transferred to the Richmond, Va. office.

Mr. G. P. Sterk, manager at Escanaba, Mich., has accepted a position in the superintendent's office at Minneapolis, and Mr. H. E. Grimes succeeds him as manager of the Escanaba office.

The new office of this company at Atlanta, Ga., was opened for business on January 28. It is fitted out in a very substantial manner and has 133 desk sittings.

Mr. B. A. Harris, formerly chief operator of the Western Union Telegraph Company, at Memphis, Tenn., and later occupying a position in the New Orleans office, has decided to rest for a year at Helena, Ark., owing to a break down in his nervous system.

Mr. John J. McCloskey, formerly an operator in the Sedalia, Mo., Western Union office, has been appointed city collector for the same company at Kansas City, Mo. He succeeds Mr. E. M. Edwards, recently promoted to the position of special commercial agent at Kansas City.

Mr. Louis Casper, for many years identified with the Western Union Telegraph service in Chicago and at other points, but for the past three years a member of the faculty of the Port Arthur Business College, at Port Arthur, Tex., has re-entered the telegraph service at New Orleans, La., where he has accepted the position of superintendent of equipment of this company. Mr. Casper is well qualified to fill the duties of his new position. Before leaving Port Arthur he installed a regular Marconi station at the Port Arthur Business College, using a steel tower for the aerial, surmounted by a forty-five foot wooden mast, making the total height, 180 feet. A 2-kw sending transformer and regular standard Marconi apparatus are used.

Mr. Hayden D. Austin, district traffic supervisor of the Western Union Telegraph Company with headquarters at Philadelphia, was born at Camden, N. J., in March, 1875. In July, 1895, he entered the telegraph service at Winslow Junction, N. J., on the Pennsylvania Railroad, and was employed at various points on that line, the Central Railroad of New Jersey and the Philadelphia and Reading Railroad until 1899 when he accepted a position with the American Telephone and Telegraph Company at Philadelphia, as connecting board operator. He

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was later advanced to the position of assistant chief operator at that point. In 1900 he was transferred to the Reading, Pa., office of the same company as chief operator, becoming manager some years later. He was made district traffic chief in April, 1908, and on January 1 of this year he was appointed to his present position.

Opening of New Operating Room at Seattle.

The new operating department of this company's office at Seattle, Wash., was formally opened on January 20. The new quarters are located on the sixth floor of the Bailey Building, and the patrons of the company were invited to inspect the new office and witness the actual operation of handling telegraph business.

Rush Taggart, General Counsel Western Union Telegraph Company.

Mr. Rush Taggart, whose appointment as general counsel for the Western Union Telegraph Company was announced February 1, comes from the Buckeye State, having been born at Smithville, Wayne County, Ohio, September 4, 1849. Shortly after his graduation from the law department of the University of Michigan in 1875, he accepted a position in the service of the Pennsylvania Company at Salem, Ohio, as assistant in the office of Solicitor J. T. Brooks. In the fall of 1877, upon the promotion of Solicitor Brooks to the position of general

MR. RUSH TAGGART,
General Counsel Western Union Telegraph Company, New York.

counsel, Mr. Taggart was made solicitor, and for the succeeding ten years had charge of all the legal business on the lines of the Pittsburg, Fort Wayne and Chicago Railway and branches in the state of Ohio.

Coming to New York in 1887, he entered the law office of Dillon and Swayne, the senior member of which was Judge John F. Dillon, now consulting counsel of the Western Union Telegraph Company, the junior member being the late General Wager Swayne, himself an Ohioan and a friend of the young attorney. On May 11, 1887, Mr. Taggart became identified with the law department of the Western Union Telegraph Company, in which department he has since been able to render conspicuous service. Mr. Taggart is well versed in the law, possesses a keen analytical mind and is a speaker of more than ordinary ability.

C. A. Comstock Advanced to a Superintendency.

Mr. Curtis A. Comstock, manager of the Milwaukee, Wis., office of the Postal Telegraph-Cable Company, has been appointed superintendent of offices in Wisconsin, Northern Michigan, Iowa, South Dakota and Minnesota with headquarters in Chicago, as previously announced in these columns. Mr. Comstock was born in Adrian, Mich., August

MR. C. A. COMSTOCK,
Superintendent Postal Telegraph-Cable Company, Chicago.

3, 1872, and began his telegraphic career in Appleton, Wis., in 1890. In 1891 he went to Milwaukee as manager of the wholesale district branch office, and afterwards became cashier, then chief operator in the main office. In 1902 and 1903 he was employed at El Paso, Tex., and Omaha, Neb., and in 1904 returned to Milwaukee as assistant manager. In the following year he became manager of the office and held this position at the time of his promotion to the superintendency. Mr. Comstock has been a Postal man throughout his entire business career and is a capable and industrious gentleman.

Municipal Electricians.

Fire Alarm.—A patent (No. 981,998) has been granted to A. Goldstein, New York, on an Electrical Thermostatic Fire Alarm System.

Fire Alarm System.—A patent (983,191) has been issued to F. B. Wood of New York, on an electric signal system for fire alarms.

New Fire Alarm System for Syracuse.—It is likely that the fire-alarm telegraph system of Syracuse, N. Y., will be modernized. Chief Quigley has been largely instrumental in bringing about this result.

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New Building for Western Union Telegraph Company and New York Telephone Company.

The accompanying illustrations show two views of the new building of the New York Telephone Company, which is to be erected on a plot of ground running from Walker Street to Lispenard Street, New York. About a year ago the company purchased, at a cost of approximately $500,000, property at Nos. 18-24 Lispenard Street, and Nos. 18-26 Walker Street, having a total area of about 21,000 square feet. This property has a frontage of approximately ninety feet on Lispenard Street and 125 feet on Walker Street, and a total depth from street to street of approximately 200 feet.

It is the intention to erect on this property an initial building of about seventeen stories; the foundation and framing, however, will be planned for an ultimate height of twenty-four stories. The floor plan of the building will be in the shape of the letter "L," with a floor area of approximately 14,000 square feet. It is estimated that the initial

FIG. 1.—LISPENARD STREET END OF BUILDING.

building will cost in the neighborhood of $1,250,000. It is the intention to start constructing the foundations about March 15, and to begin the structural steel work and masonry walls about June 15, with the expectation of having the building ready for occupancy about March 1, 1912.

When finished the building will be occupied about as follows: The first floor will be rented for stores; the second floor will be used for office space by the New York Telephone Company; the third, fourth, fifth, and about half of the sixth floors will be used by the American Telephone and Telegraph Company for terminal and operating rooms, quarters and offices; the seventh eighth, ninth, tenth and certain portions of some of the other floors will be used by the New York Telephone Company for office space for the various division superintendents and their forces.

The Western Union Telegraph Company will occupy a portion of the building. It will have the main operating room and terminal rooms there and also some business offices.

The American Telephone and Telegraph Company will install in this building as soon as it is completed the largest long-distance switchboard in this country having approximately 200 positions for operators. While no local switchboard will be installed in the initial building, it is the intention later, when additional stories have been added, to install two and possibly three local switchboards

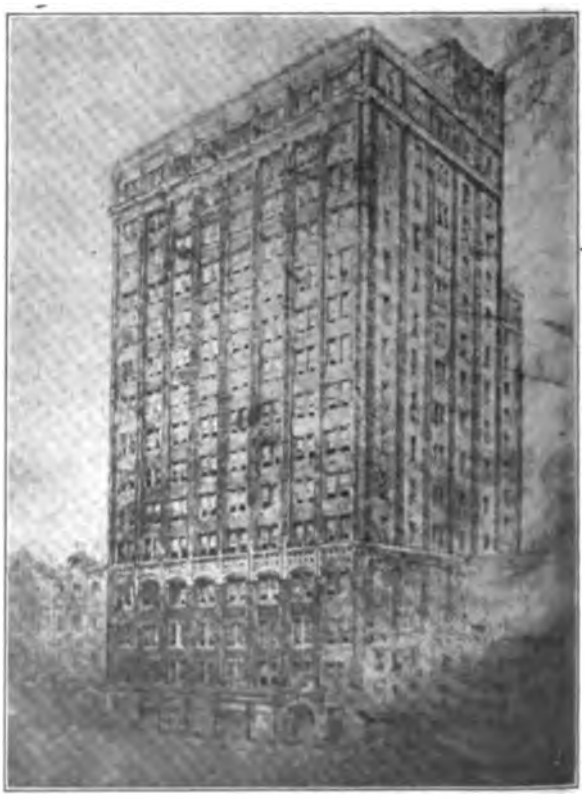

FIG. 2.—WALKER STREET END OF BUILDING.

which will be capable of furnishing service to approximately 60,000 stations.

The proposed quarters for the central office employes are being carefully considered with a view to giving them adequate locker and dining-room facilities and large cheerful retiring rooms. The company is considering finishing up the roof of the building in order that it may be used in the nature of a roof garden. In addition to these provisions for the welfare of the central office operators, three large ventilating plants will be installed in order to furnish adequate ventilation at all times for the large number of operators who will be on duty. Similar provisions will be made for the telegraph quarters in the building.

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Military Telegrapher in the Civil War.

PART LIV.

Among those who took an active and prominent part in the exciting times attending the civil war, and who was one of the most trusted of military telegraphers, was Mr. E. C. Boyle. Mr. Boyle's story of events in Louisville during the campaign and his relations with the great generals representing the Union cause is a most interesting one. He traces his war experiences back to that memorable event, the fall of Fort Sumter, and carries us through the exciting days in Louisville and the adjacent country. Mr. Boyle's narrative, in part, follows:

In giving a history of my connection with the United States Military Telegraph it will not be out of place to give a brief description of the state of affairs for some months after the fall of Fort Sumter and before there were any regular military operators in the department of the Cumberland. My brother, T. R. Boyle, deceased, had charge and was manager of the telegraph office at Louisville, I being assistant manager, and we both had charge of the government ciphers and attended to that duty for several months until regular cipher operators were appointed. I remember my first military duty was to deliver in person a very important telegram to General L. H. Rousseau, who was at that time quartered at Camp Joe Holt, Jeffersonville, Ind. This was my first experience in a military camp. I was ordered to halt by the sentry, and I called out to General Rousseau to order the sentry to pass me as I was the bearer of important dispatches. The general did so and at once invited me to his headquarters, treated me very politely and was always after that a warm friend of mine.

The Army of the Cumberland was organized and General Robert Anderson was the first commanding officer of the department. On September 27, 1862, at 11 o'clock p. m., No. 1 and 2 southern wires were cut between Louisville and Bowling Green. All in the office felt almost certain that the lines were destroyed by the Confederate forces under General Buckner, so as to cut off our further communication south. General Buckner had planned a surprise. Had he first directed squads of troopers, each accompanied by an operator, to capture and control some of the northern telegraph offices, and moved more cautiously by rail, instead of cutting the wires between Bowling Green and Louisville as he did, and having his forward engine dumped in the ditch as it was, by reason of a rail being displaced by loyal young Crutcher, there can be no doubt but that he could have taken the city.

The news of the wires being down spread very rapidly, and it was supposed that Buckner was advancing on Louisville. In the meantime the employees of the Louisville and Nashville Railroad Company commenced tearing down the poles and wires in the vicinity of the depot under the impression that they were helping the Union cause by doing so. About 6 o'clock p. m., Captain Green and Major Murray, both of General Anderson's staff, came to the office and informed me that their object in coming was to take charge of the southern wires to see that no communications were sent over them, etc. I told the gentlemen that the wires south were down and that it was impossible for any one to transmit or receive news over them. Captain Green also informed me that they had orders not to allow any of the wires in the office to be worked. He then requested me to go with him to General Anderson and talk to him in regard to the matter. After being introduced, the General asked me if I was a Union man, and he required me to give my word of honor that no treasonable messages would be sent south. On my giving assurance that his orders would be carried out the two officers named were relieved from further duty at the office. I mentioned to General Anderson about the railroad men destroying the wires and explained to him how essential it was to have the wires in working order so that he could be in almost constant communication with the troops that were to leave that night. I promised also to send operator John Lenhart with the troops and this seemed to please him very much, and he issued an order at once for no one to interfere with the telegraph wires. A few weeks after the troops left Louisville, General W. T. Sherman was placed in command of the department with headquarters at Louisville.

General Wm. Nelson was in command of the district of Louisville. There was much excitement, as the Confederates under General Bragg were supposed to be marching on the city. A pontoon bridge was placed across the Ohio and several thousand people crossed to Indiana, fearing that Bragg would take the city. General Nelson told me that there were nine chances against us to one in our favor. He had a number of heavy guns and ordnance supplies removed from the city. There was intense excitement and much apprehension of an attack until General Buell and his army reached the city. About the same day that General Buell arrived General Nelson grossly insulted a brother officer and was shot for the offence. The shooting occurred at the Galt House. I was there a few minutes after it happened.

A few days after the arrival of General Buell's army, General Thomas received a telegram from the Secretary of War ordering him to relieve General Buell and assume command of the Army of the Cumberland. General Buell at the same time was ordered to report at Indianapolis for orders. General Thomas answered the telegram at once and requested that General Buell be reinstated in command as we were on the eve of a battle and he believed it was for the good of the service. General Thomas told me that General Buell knew the geography of the country, and had just reorganized the army to meet Bragg. Soon after October 8, after the battle of Perryville, Ky., Buell was relieved and General Thomas took command of the Army of the Cumberland.

Early in 1866 I was appointed manager of the Nashville, Tenn., office, among my operators being

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D. O. Dyer, George Everett, B. B. Glass, Ellis Wilson, John Thode, E. M. Shape, G. H. Shape and others, who worked early and late. Nashville was the headquarters for the Army of the Tennessee and the Army of the Cumberland. There were usually a large number of troops quartered about the city, consequently the telegraph business was very heavy. It required efficient operators and much care to keep the files clear, and the amount of newspaper matter at times was very large. We managed to give full satisfaction and I heard very few complaints considering the amount of business handled.

On November 30 I received an important telegram from General Schofield giving the particulars of the battle of Franklin, Tenn. I delivered the message in person at the St. Cloud Hotel. The late ex-president, Andrew Johnson, who was military governor, and medical director Cooper, were present. As soon as General Thomas read the message and made known the contents Governor Johnson got up and shook hands with me and said the news was glorious.

I will conclude my narrative by stating that my business relations with such of the officers of the Army of the Tennessee and the Army of the Cumberland that I met were always pleasant and agreeable. After the battle of Nashville I sent a communication to General Thomas asking permission to keep the office open on Sundays one hour in the morning and then closed until 6 p. m., so as to give the men a chance to attend church. The General approved of it at once. Before this the office was usually open all day for military business. When the United States Military lines were turned over to the commercial company, I received an autograph letter of recommendation from General George H. Thomas, which I value highly for the reason that he was such a noble and conscientious man. He gave me credit for efficiency in carrying out all his orders, etc.

Combined Quadruplex and Telephone Circuits.

BY L. C. MCINTOSH, LOS ANGELES, CAL.

Where two quadruplex circuits parallel each other along the railroad right of way and a Morse circuit is not available, or by reason of too many relays, is not adaptable to telegraphone circuits, it frequently becomes necessary to bridge the quadruplex circuits for a telephone line by using condensers on each side of the telephone and tapping the quadruplex circuits at the different stations along the line, the trainmen being provided with a forked pole for cutting in at any point between stations.

This makes an ideal telephone circuit with all the necessary retardation in the quadruplex apparatus at each terminal to back it up, but, unless some provision is made to balance the two telegraph circuits with each other there will surely be trouble on the circuit which has a short end battery to line while the other has a long end battery to line. In other words it will be impossible to make both circuits work four cornered simultaneously, due to the kick through the condensers bridged across the lines.

The writer has found that by introducing a similar arrangement, minus the telephone instrument, across the artificial lines of the two circuits the interference can be entirely eliminated. To do this it is only necessary to tap the artificial lines at the terminal stations at their entrance to the rheostats and connect an adjustable condenser between the two with an adjustable resistance on each side of the condenser as shown in the illustration.

If a pre-determined number of telephones are installed on the circuits and not more than one is connected or disconnected at a time, as would be the case when trainmen cut in and out, the condenser and resistances can remain at a fixed value, and after the capacity required is once definitely established by the use of adjustable apparatus, permanent resistance and blind condensers can be substituted. There will then be no necessity for a change, as the addition of one telephone set will hardly be perceptible after a certain capacity has been introduced.

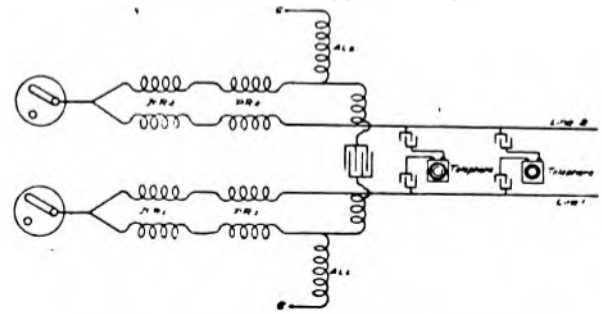

DIAGRAM OF COMBINED QUADRUPLEX AND TELEPHONE CIRCUITS.

We are operating a circuit over the Southern Pacific lines between Los Angeles and Bakersfield, Cal., with telephones bridged across the two quadruplex circuits with much success. Before the condensers were introduced across the artificial lines, it was impossible for us to work four corners on both circuits simultaneously. I believe that it is possible to extend this telephone circuit to San Francisco, the distant terminal of the quadruplex circuits. It might be necessary to transpose south of Bakersfield on such a long line, but the wires separate and take different routes north of that station.

Messenger on Skiis.—A messenger of the Postal Telegraph-Cable Company in Reno, Nev., attracted much attention recently by delivering messages on skiis. He made rapid progress by means of his new method of locomotion.

Telephone and Telegraph in Switzerland.

Practically every post office in Switzerland is provided with a public telephone and telegraph, and every community, no matter how remote, is supplied with both services. Rates are low, and every inducement is offered to the public to use the telephone and telegraph as means of communication.

The total number of telegrams sent and received during 1909 was 5,202,969.

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Wire Patching and Testing.

BY WILLIS H. JONES.

The many requests received from all quarters for the names of good books covering wire and switch work indicates that the subject is an interesting one for both layman and expert. In the absence of particulars, however, this is rather a difficult question to answer. There are a number of standard works which, collectively, contain about all the information required by a wire chief, such, for example, as Maver's American Telegraphy, Jones' Pocket Edition of Diagrams, Schneider's Electrical Instruments and Testing, etc., yet no one makes a feature of that particular subject. In other words, there is no single book published, so far as the writer can learn, which deals with the subject exclusively, or any which attempts to cover the subject fully.

For the purpose of directing those seeking information of this character, the following suggestions are offered:

A novice should first procure a good text book and acquire a knowledge of Ohm's law, relative to electromotive force, the resistance of wires and currents. Without such knowledge he need not expect to ever be able to make wire patches or test intelligently.

Again, it would be unwise for him to attempt handling voltmeters, ammeters, or galvanometers,

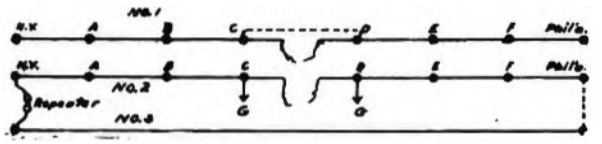

DIAGRAM OF WIRE PATCHING.

without first learning their construction and principle of operation. Hence he should study each instrument separately. Swope's Lessons in Practical Electricity, or any one of the first named books, contains information on this subject. In these books will also be found the latest and most approved formulas and methods used in making all the various tests a wire chief will probably ever be required to make. Such formulas, for example, as Varley's and Murray's Loop tests, the three-wire method, etc. These should be studied carefully and the principles involved mastered.

Finally, there are things to be learned in handling wires at a switchboard which can only be learned through actual experience. Each wire possesses an individuality of its own if studied closely. Some wires differ widely from others, while a few may show many points of resemblance.

It is the knowledge of the individual merits, faults, and other peculiarities of the wires that is necessary in order to test and patch, not only quickly, but to the best advantage. As previously stated, this knowledge cannot be obtained from any book, but in an article it is possible to point out some of the features which the layman will recognize after a few weeks' experience at a main wire switch board.

For the purpose of illustration we will follow the operation of an experienced wire chief testing and patching a broken way wire between, say, New York and Philadelphia. He has been notified that the wire is open, but of course has no idea of where the break is. An inexperienced chief would simply have to guess at the location and possibly test with half of the stations along the line before finally locating the fault. Not so, however, with the experienced chief. He is familiar with the normal "feel" of the circuit when it is "O. K.," and other conditions pertaining to it. For instance, he knows that a way wire with several relays in circuit if open at the distant end will give a pronounced static kick on his test relay every time he taps his key, and that each station this side will give a diminishing return discharge. Hence when he inserts his instrument in a broken wire, if the kick is nearly normal he knows that the fault is probably a long distance away. If it is feeble it is near by. He, therefore, for a test, calls up on another circuit a station through which the faulty wire runs, and as a rule his guess is not far out of the way. Usually one or two trials will locate the break.

In case the wire had been reported grounded instead of open he would estimate the probable distance to the fault by noting the strength of current flowing through his test relay, as indicated by the magnetic pull on the armature. If the pull should be unusually strong he would know by that fact that the ground was near by, and vice versa, more distant if the pull was nearly normal. Having located the break between, say, stations C and D, as shown in the illustration (wire No. 1), by ascertaining that the ground at the switch board at station C would close the circuit and that station D's ground would not, the next operation is to find some available idle wire to connect the broken ends of the circuit together between the switch board at C and the board at D. If there is a short wire available between those points, the chief would use that as the first choice, for economical reasons. If not, he may be compelled to use a full length wire between New York and Philadelphia as shown in the lower portion of the diagram. In this case he would tell Philadelphia to connect the two wires, No. 1 and No. 3 together at his board. New York would then have a circuit to all stations between D and Philadelphia by thus picking up the other end of wire No. 1. The other portion of the wire No. 1 between New York and C would, of course, be O. K. as long as C kept his ground on as shown on wire No. 2. The chief would then only have to keep battery on wires No. 1 and No. 3 and connect the two together in one circuit by means of a repeater as shown in the diagram. With this arrangement all stations will be able to work with one another just the same as if wire No. 1 had not been open or grounded in the first place.

This, of course, is a very elementary illustration

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of wire testing and patching. Experience alone will give the necessary knowledge concerning the various wires and conditions of circuits that will enable one to choose wisely.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER XL.

What led to the discovery that telegraphy and telephony could be carried on over one circuit at the same time?

By whom was this possibility discovered?

In what manner was it demonstrated that the inductive effect of a telegraph circuit upon a telephone circuit could be minimized?

How many conductors are necessary to form a combination telegraph-telephone circuit?

How is the telephone apparatus connected to the circuit with reference to the telegraph apparatus?

What is the effect of the condenser in the bridged telephone circuit?

What is the principal advantage of the Van Rysselberghe system of simultaneous telegraphy and telephony?

Why is it necessary to bridge all Morse telegraph keys with condensers?

In a combined telegraph-telephone circuit is there ever an actual break in the line current?

Why is it necessary to preserve continuity of current?

What is the chief feature of the Pfund method of simultaneous telegraphy and telephony?

How are telephones on regular telephone circuits connected?

Is duplex telephony used to any extent?

Describe the Jacobs' duplex telephone as shown in Fig. 125.

CHAPTER XLI.

What is the phonoplex?

What is the effect of phonoplex operation on wires on the same poles?

How are the impulses used in phonoplex operation generated?

Describe the operation of the phonoplex.

CHAPTER XLII.

In wireless telegraphy what is the medium of propagation of electric waves?

What is the ether?

In wireless telegraphy do the electrical waves travel in any one direction?

How are the electrical waves produced?

What happens when a disruptive discharge takes place across the air gap between the two terminals of the primary coil in an induction coil?

How are the effects of such a discharge demonstrated?

In wireless telegraphy what code is used, the Morse or Continental?

How are the electric waves intercepted at the receiving station?

What is a coherer?

How is a coherer constructed?

What is the purpose of the coherer and how does it act in the presence of electric waves?

Telephone and Telegraph System.

Mr. Harry O. Rugh, of Sandwich, Ill., has been granted a patent upon a system of simultaneous telegraphy and telephony over one circuit. In this system Mr. Rugh employs two line wires, and means at one station for the selective calling of any other station over the first wire. Claim 5, which covers the system, reads as follows:

"A telegraph and telephone system, comprising two line wires and a plurality of stations, means at one station for selectively calling over the first line wire any of the other stations, selective signal-receiving means at each station associated with the first aforesaid line wire, telephone instruments for communicating over the second line wire between the calling station and any station selectively called, telegraphic instruments for communicating over the first aforesaid line wire, telegraph instruments adapted for operation over said first aforesaid line wire, and means associated with said first aforesaid line wire to prevent interference between simultaneously operating telephone and telegraph instruments."

Change of Date of Old Timers' Atlantic City Meeting.—The date of the meeting of the Old Time Telegraphers and Historical Association, and the Society of the United States Military Telegraph Corps, which is to be held at Atlantic City, N. J., next September, has been changed to September 5, 6 and 7. The headquarters will be at the Marlborough-Blenheim. Col. W. B. Wilson, Holmesburg, Pa., is president of both associations, and Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old Time Telegraphers and Historical Association. Mr. David Homer Bates, 658 Broadway, is secretary of the Society of the United States Military Telegraph Corps.

Mental Anguish at Bargain Counter Rates.—The suit brought against one of the telegraph companies under the Mental Anguish Law in a southern state names the amount of Mental Anguish damages as $999.99. The suit is brought by a woman who evidently is particular as to the exact value of her feelings, which were badly lacerated by the delay in the delivery of a message.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher,
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

February 16, 1911.

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

Mr. Vail on the Future of the Combination of the Telegraph and Telephone.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and president of the Western Union Telegraph Company, predicts that a large part of the business correspondence of the country will be done by telephone and telegraph. He also states that the combination of the telephone and telegraph services will effect a great improvement in the service of telephone and telegraph and enable new services to be given to the public at rates which will permit the public to utilize the wires more than at present. Mr. Vail states that efforts are being made to find a means of recording a spoken message so as to obviate the chance of error in transmission over the telephone. "We are experimenting with every device that promises results," he said, "and I believe some such means of record is possible and before long will be in general use. It is probable that the distance over which personal conversation can be carried on will be from ocean to ocean in the not distant future."

Destruction of Poles by Woodpeckers and Insects.

In connection with the growing scarcity of timber suitable for telegraph and telephone poles, the ravages of birds and insects have come in for a good deal of attention in late years. The woodpecker is responsible for much of the damage, and ants and other woodboring insects do their share of the work of destruction. The effect of the woodpeckers' injurious activity is outwardly visible and this fact offers an opportunity to check the damage before it has gone too far, providing a reliable method of discouraging the bird in its work is known and applied. How this can best be done, however, is a problem that is not easy of solution. Various expedients have been tried with indifferent success. It was thought that poles treated with chemical preservatives would be proof against these attacks, but in some parts of the country birds seem to thrive upon the chemicals. Traps, shot guns, and other methods of discouragement and execution have been tried. They are effective as far as concerns birds caught in the act, but what is needed is something that will distract the birds at any and all times.

We print elsewhere in this issue extracts from letters on this subject received from various sources throughout the country. They indicate that the difficulty is a real one in many sections, and that the remedy is still to be found. In the case of woodpeckers, their natural habit is to look for insects, larvae, etc., on which they feed, in the crevices in the bark of trees. But telegraph poles are denuded of bark, and the question arises what is there about a bare pole that attracts the birds? One explanation suggested is that the humming noise due to the vibrations of the wires may lead the birds to the belief that it comes from insects within the wood.

Ants, according to one correspondent, constitute an enemy to be reckoned with. Their damage to a pole is mainly on the inside and not always visible from the outside, and this is a more dangerous form of injury.

In some countries wild animals seem to regard the telegraph pole as having been erected for the purpose of enabling them to scratch their backs, and where elephants indulge in such pleasantries the poles suffer. In our own country years ago the buffalo got the same idea into his head with consequent disaster to the poles.

But the necessity for a cure of these evils will bring about a cure in time, and he who discovers an effective remedy will deserve a monument to his memory, as one correspondent suggests.

Honesty.

A young man employed by one of the telegraph companies in New York was arrested the other day in a suburban town charged with forging telegraph money orders. He was only twenty-two years of

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age and by this misstep he has ruined his career. In some crimes the force of extenuating circumstances are admitted, but in cases of deliberate dishonesty and infidelity, it is a question if such circumstances should be recognized. Any one who occupies a position of trust and betrays his employer's interests, does not as a rule, commit his crime under a momentary evil impulse. Generally the act is designed.

Without discussing the subject in its moral aspect, it is sad indeed to see a young man blight his career for life by a false step which could easily have been avoided. The question of temptation usually figures largely in cases of this kind, but the truth is, the cause is not to be found in the temptation but in the yielding to it. Temptation will exist so long as the individual is willing to yield to it. The only proof aganst temptation is an honest character, and no one can question the wisdom of impressing this important fact upon the minds of all young people.

Telegraphy in Signal Corps Work.

BY CAPTAIN WILLIAM L. HALLAHAN, NATIONAL GUARD, N. Y.

The purpose of this article is to demonstrate how a telegraph operator in the city of New York may learn those features of the telegraph business that will make him most valuable to his employers, increase his earning capacity and enlarge his social status, as well as to greatly advance his usefulness as a member of the community; and all this outside of his office hours and at no expense when compared with the results obtained.

There are in the city of New York two companies of the signal corps; the First Company in Manhattan and the Second Company in Brooklyn. In most respects these companies are similar. I will take the Manhattan company for example.

This company has a large armory with every facility for laboratory practice, so far as the telegraph business is concerned. It has all the known scientific methods for constructing, operating and testing telegraph and telephone lines, as well as a complete wireless equipment.

It is the Signal Corps of the army that has made the most striking advances in wireless achievement. In the National Guard Signal Corps, the city operator may learn both the practical and theoretical side of the wireless. One enlistment in this arm of the service means the making of a practical electrician out of a man with any sort of brains. It prepares a man for all emergencies, with a knowledge of all sorts of short cuts and makeshifts to keep a line working at high pressure, at all times and under all conditions. The telegraph companies need this kind of men, and the man who, if the occasion arose, could test his line for breaks and leaks, find them and repair them, is one man in a thousand, and is the man who is going ahead. This is the kind of man turned out by the signal corps.

A large number of men at the head of affairs in the telegraph business today saw service in the signal corps during the Civil War, and the man with the same training today or the tomorrow that may come, will be the leader of the future.

In the event of war, which we all hope will never occur, a large number of patriotic operators would enlist in the service of Uncle Sam. The advantages that men with previous experience in the National Guard, trained in military discipline, would have then in the line of promotion, over those who volunteered at the last moment, are obvious. The various grades of office are much larger in the signal corps than in any other branch, and in war time the signal corps would be suddenly enlarged, so that the sergeant of today may be the commissioned officer of tomorrow.

There is no monotony in the signal corps work. There is the field buzzer, the telephone, the telegraph, the heliograph and the old-fashioned, but ever useful, wig-wag, and for night signaling, the acetylene lantern, searchlight, the Ardois system of electric lights, rockets and bombs. A signalman must be a lineman, too, able to climb poles, tie and splice wire, and run lines under all conditions of weather and territory. He is, also, taught to ride a horse. Starting with a walk, he is coached through all the gaits, until he learns to stick, mount and dismount, ride standing on two or more horses, vault over horses at a canter and gallop, and, in fact, every sort of exercise that will make a real horseman out of him, able to manage his mount under all conditions. A first-class gymnasium is at his disposal to aid in putting his muscles in shape for these "stunts."

If his military ardor runs to the very proper desire to appear as a dashing trooper, this organization has a distinctive full dress uniform, admitted to be one of the most striking in the country.

The signal corps is a small organization. The men know each other, the officers are in touch with them and know their capabilities. The man joining becomes acquainted with a crowd of clean young fellows, in all sorts of different professions. He broadens the number of his acquaintances and makes friendships that are no less strong and lasting than those of college days; and, above all, in the case of a telegraph operator, he is improving his spare time for future advancement in his profession, with which the signal service is so closely associated.

Wood Preservers' Association.—The seventh annual convention of the Wood Preservers' Association was held at the Auditorium Hotel, Chicago, on January 17, 18 and 19. Papers relating chiefly to the preservative treatment of timbers for railroad ties were read and discussed.

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Submarine Cable-Laying and Repairing.

BY CHARLES BRIGHT, F.R.S.E.

(Continued from page 121.)

JOINTING AND SPLICING.—Having dealt with the various types of cable in vogue, the author proceeded to deal with the jointing and splicing operations in uniting two lengths whether of the same type or of different types. Obviously (said the lecturer), these are operations which would form an important feature in any cable work the Navy might have to undertake. Let us first take the joint in the conductor and insulating material. As a preliminary, we must cut away the gutta-percha insulation of the two ends sufficiently to bare the conductor for about an inch and a half from either end. The several wires of the copper strand are now unlaid, and each is pulled out straight at their various angles, care being taken to give them no twist. Each is then separately cleaned either with fine emery paper or the back of a knife blade, more particularly in order to get rid of all the compound used for satisfactorily uniting the insulating gum with the wire. With the aid of a pair of flat-nosed pliers the bared wires are now twisted together again into a true strand for about a third of their length. The entire length of the exposed ends is then, each in turn, dipped into a lump of molten solder on the soldering iron in order to re-unite thoroughly the separate wires of the strand, as so to render them practically one wire. Each end of the wire is then filed down to a long tapered wedge or scarf. The conductor ends are then placed in a vise, the respective scarfs being fitted together and pressed against one another. The two wedge surfaces are next soldered together. Over the joint and one either side for a distance equal to its length are wound two laps of fine tinned copper wire, so as to make the joint firm and permanent and to maintain continuity in the case of separation in the scarfed surfaces by failure of the metallic union. The completed joint is then finally soldered over. This work is fairly simple, but the corresponding junction in the dielectric is one which demands considerable care and experience. We will content ourselves here with the more usual case of gutta-percha.

To begin with, the ends of the core should be pared off to avoid joining to the material those portions which have received heat from the soldering iron, and which would not, therefore, join properly to the new gutta-percha about to be applied. The metallic joint and the gutta-percha ends are next cleaned by wiping over with a clean rag soaked in wood naptha. The metal conductor is now gently warmed by waving the flame of a spirit lamp underneath. Whilst this is being done the assistant jointer—over another spirit lamp—has softened the end of a stick of what is known as Chatterton's compound, composed of gutta-percha, resin and Stockholm tar. The jointer now lightly dabs the heated compound along the bare conductor, afterwards spreading the adhering compound evenly around the strand with a warm tooling iron. The joint is now ready for the first covering. This is effected by drawing a portion of the gutta-percha from each end over the joint. The ends of the gutta-percha to be joined are warmed by the lamp—in the same way as with the compounded conductor—thereby softening it for nearly 2 in. on each side, the two ends of the gum being gradually drawn down towards one another till about ½ in. apart, until the joint is enveloped in a covering materially thinner than, but nearly as uniform as, the rest of the conductor. The joint is allowed to cool and set for a while. We next warm and tool over the surface preparatory to applying a fresh piece of gutta-percha. A strip of gutta-percha sheet, especially kept for jointing, is then carefully softened over the lamp and a piece cut off. The jointer takes the strip into his fingers and applies it from underneath lengthways. The edges are then raised, and gradually, by a uniform pressure, brought together at the top, so as completely to surround the core. The jointer trims off the excess strip with a pair of bent scissors, and proceeds to apply the iron, heated to the required temperature, to smooth off any inequalities, and complete this second covering by rubbing into shape with the moistened palm of the hand. The third covering is applied to the joint in precisely the same way. In this third covering the strip is longer by an inch or more at each end than the previous one, so as to insure complete overlapping. When finished, a well-made joint is usually from 6 in. to 8 in. in length. It is now cooled and hardened with water, the whole process from start to finish usually occupying nearly an hour. The work of jointing is of the greatest practical importance in connection with the repair of submarine telegraph cables, hence the length at which I have dealt with this part of my subject. A first-rate jointer is an important factor in the success of the work. I might have gone into still further details in view of how much depends upon the good behavior of a joint.

We now come to the splice in the armor. On the completion of the joint as described, the first operation previous to starting on the splice between the two lengths of cable is that of cutting off a sufficient length of the existing inner serving, to avoid a double thickness. There are two sorts of splices, applicable for two different occasions. There is the butt or "laid in" splice for joining two cables of similar type, and there is the overlapping splice, for uniting two cables where one is of a materially larger diameter than the other. Turning to the first, let us say that two similar iron-sheathed cables, A and B, are to be spliced together. The outer serving of this cable is stripped off, and the wires unlaid for a certain distance, this depending on the length of splice about to be effected. A given length of the core is then cut out—preparatory to making the joint in the dielectric, the splice naturally involving a diminishment in proportion to its length. An iron wire seizing is applied to B, the distance from the end being regulated by the length of splice to be made. If intended for quite shallow water the distance is sometimes only about 10 ft., if for deep

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water it may be as much as sixteen fathoms long. A good rule for the length of splice in a deep sea cable is one fathom per wire—*i.e.*, so many fathoms according to the number of wires, the object being to avoid the butts between wires coming too close to one another. Unlaying the wires is often accomplished with a splicing tool consisting of an iron collar, pierced with holes and fitted with two handles diametrically opposite to one another. The collar is in two halves hinged at one side, and secured by a pin at the other. Each sheathing wire is passed through a hole in the collar, the core being in the hollow centre. A man works the tool along the cable, turning it round the cable the opposite way to the lay of the wires as he advances, while the served core passing through the centre of the collar, remains stationary. A second "hand" follows with a similar tool at a short distance, in order to retain the wires in their proper relative position. After the joint in the dielectric has been made it is carefully protected by jute serving built up to the proper diameter, so as to form a suitable bed for the wires. Each iron wire is taken in succession, cut to the required length and laid in as the corresponding wire on the other end is taken out to the necessary distance. All the wires are similarly dealt with in turn, the individual butts being kept about a fathom apart. The splice in the sheathing being completed, one end is held between tongs, the inside diameter of which exactly corresponds to the size of the cable. A man then drives the tongs towards the other end of the splice by means of a hammer, so forcing the wires into their places and giving the cable practically as regular a formation here as elsewhere. The splice finally receives a covering of spun yarn tightly wound round with a serving mallet. This serving should extend at least 3 ft. beyond the extreme limits of the splice.

Now, as to the overlapping splice for uniting dissimilar types of cable, or different lays. Let us call A the smaller of two cables, B the larger. The method of procedure will be precisely the same as in the preceding butt splice, until the wires of B have been relaid from B to A. All the wires of B—sometimes two or three taken together—are now twisted spirally round A as before, but without disturbing the sheathing of A. The ends of the B wires are then secured with fine wire seizings at about every fathom, and the whole splice served over with spun yarn as in the preceding operation. This form of splice is often resorted to in emergencies, in cases where it would not perhaps be so suitable as a laid-in splice, chiefly because of the saving in time. As in the case of the joint, technical knowledge has little to do with excellence in cable splicing. The degree of success achieved is mainly dependent on the "hands" who carry out the work.

Effect of Sending Machines Upon Quadruplexes.

BY J. P. O'DONOHUE, DIVISION ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

During a series of quadruplex experiments recently made in our laboratory, the detrimental effects of high speeds of polar reversals upon the common side margin were clearly brought out. The results of these tests will no doubt be of interest to all chiefs and operators at this time, owing to the now general use of sending machines.

Upon an artificial line representing 600 miles of No. 9 copper overhead construction, using standard sets and voltages, it was found that when the polar side was operated at a rate of fifteen words a minute, the common side was capable of a speed of forty words a minute. Increasing the polar speed to thirty words a minute greatly reduced the common side margin and lowered the working speed to twenty words. Operating the polar at forty-five words cut the common to fifteen words and running up the polar to sixty words rendered the common side practically useless at any speed. Automatic sending devices were employed during these tests, so as to obtain uniform signals under all speed conditions.

Now here is where the sending machine comes in! These sending machines are very often so adjusted that the dots are made at the rate of fifty words a minute, while the actual speed made by the operator is only thirty words a minute. When the machines are used on polar sides of quadruplexes the common sides suffer a serious reduction in working margin due to the high speed dot reversals on the polar side and, consequently, the total carrying capacity of the quadruplex is lowered, without any gain whatever. Not only are the high speed dots wasteful of margin, but the lack of proportion and rhythm in the signals is very trying to the receivers. There is no gain in speed and much is lost in comfort when the dots are disproportionately rapid. The quadruplexes and duplexes have been improved and more improvements are coming; but it is bad practice to send out signals known to be much less perfect than they could easily be made. Everyone at repeater stations notices that the signals from sending machines have a tendency to be thin and chippy.

Sending operators always know when the dots are needlessly fast and they can add to the comfort of receivers and help to make good signals by giving careful attention to the adjustment of their sending machines. The dot speed should be kept in strict relation to the speed of the dashes.—*Postal Telegraph.*

Morse Electric Club Dinner.—Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, and president of the Western Union Telegraph Company, will be the principal guest of honor at the annual dinner of the Morse Electric Club, which will be held at the Hotel Savoy, New York, February 23. The entertainment committee is making arrangements for a suitable programme for the evening and a large number of telegraph people from outside of the city will be present. Tickets for the dinner are $3.00 each, and can be procured of Mr. R. J. Murphy, treasurer, 195 Broadway, New York.

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Protection of Circuits and Apparatus from Lightning and Foreign Currents.

BY W. E. HARKNESS.

The protection of electrical apparatus connected to aerial telephone, telegraph and signal wires has been one of the principal subjects of investigation by those interested in the design, installation and maintenance of electrical equipment. The most important factors entering into this problem are common to every system of distribution, whether telephone, telegraph or signal.

SOURCE OF TROUBLE AND THE REMEDY.

The source of trouble may be divided into two distinct classes.

1.—Electrical disturbances in the atmosphere.

2.—Foreign circuits of high potential.

The first of these may be subdivided into:

(a) Direct lightning strokes.

(b) Induced static charges.

The second main classification may also be further divided into:

(c) Leakage from or contact with other circuits.

(d) Induction from adjacent circuits.

Most aerial circuits are subject to trouble from both of the primary sources mentioned, although there are some which are subject to only the first named of the two mentioned, i. e., atmospheric disturbances.

To safeguard properly circuits and apparatus, a protector must be provided which will:

First.—Reduce the potential on the circuits to a point where it cannot injure the apparatus or interfere with its operation.

Second.—Prevent an excess flow of current through the line which would destroy the apparatus or wire.

Third.—Reduce the chance of injury to the users of the apparatus.

THE EASIER WAY PROVIDED.

The usual method of guarding against high potentials is to provide some sort of a protector offering, for currents of high potential, a path to earth which has a lower break-down point than is offered by the insulation of the circuit or apparatus. In general, such protectors consist of two conducting bodies, one connected to the circuit and the other to earth, the opposing or discharge faces of the blocks being separated by a poor, or non-conductor. This arrangement produces an open air space between the blocks which serve as the path to earth for the high potential currents. In the majority of cases these protectors are exposed to the atmosphere; in some cases, however, they have been placed in tubes from which the air has been exhausted to create a partial vacuum.

The sensitiveness of these protectors, aside from questions of mechanical construction, is governed by the separation of the discharge surfaces, the nature of the insulating separators and whether they are exposed to the atmosphere or are in a partial vacuum. The rules governing these three factors are well known and need not be discussed here.

The materials used in the construction of what may be called the Open Space type protectors have been varied, carbon and both similar and dissimilar metals being used for the discharge surfaces and mica, paper, silk, linen and celluloid being among the insulating separators employed.

Carbon blocks, separated by accurately gauged mica separators have been generally used in the protection of telephone apparatus. Carbon such as is used in the vacuum tube arresters has the advantage of being able to withstand repeated discharges without being destroyed or having the reliability of the protector affected. The trouble experienced with carbon generally employed for this purpose is due to the poor quality used which permits particles to break off and collect between the two discharge surfaces, which in the usual telephone protectors are within .005 inch of each other, and thus cause a leak to earth. Attempts have been made to overcome this trouble by increasing the separation of the carbon blocks and by shaping the opposing faces, but none of these has been successful as the increased separation decreases the sensitiveness of the protector, permitting the rise of an objectionable potential on the line before the protector acts. The separation of .005 inch is necessary, in the type of protector mentioned, to obtain protection against crosses with circuits carrying potentials of 500 volts. High-grade carbon does not disintegrate and is used in the vacuum type previously mentioned, thus overcoming the trouble experienced with lower grades.

Metal in place of carbon has been used with varying success, depending upon the protection desired. It has not been as satisfactory as carbon, owing to the fact that the metal blocks tend to fuse together by discharges, or that the distance between the discharge surfaces is altered by the spitting or vaporizing of the metals, thus changing the breakdown point of the protector, with the result of reducing its effectiveness and reliability. Metal blocks are also subject to corrosion. The so-called non-arcing metals have been tried, but have not proven superior to others.

Various dielectrics, such as mica, hard rubber, silk, linen and celluloid have been used to obtain the proper spacing of the discharge surfaces. Of these mica seems to be the best, as it is practically fire-proof, non-hygroscopic and can be split to give separators of accurate thickness.

ACCURATE SPACING AND INSULATION IMPERATIVE.

In any type of open space protector it is essential that the base and supports be so designed as to establish good contact with the protector blocks and retain them in their proper relative position to insure the normal and uniform operation of the protectors. An objection common to the majority of protectors is that the mountings are not designed to secure the highest insulation between the line and ground when the protectors are exposed to dust, smoke and moisture.

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A further objection to many of the various types of protectors now on the market is the fact that the separation of the discharge surfaces is not accurately gauged, nor does it remain constant after repeated discharges. As a result the break-down point is usually far in excess of that of the apparatus which it is supposed to protect.

PROTECTION AGAINST ABNORMAL CURRENTS.

So far, protection against high potentials only has been considered. There still remains the need of protection against abnormal currents or those of excessive strength. There seems to be but one recognized method of providing this protection, i. e., by means of properly proportioned fuses which will operate when currents above a predetermined strength flow over the circuit. There are in use two general types of fuses; the open or link fuse and the enclosed or tubular type fuse.

There seems to be no question as to the superiority of the enclosed or tubular type fuse over the open link fuse. The enclosed type not only affords a mechanical protection to the fuse wire, but insures better contacts and more accurate and reliable operation.

In many cases the function of the fuse has been confounded with that of the open space protector and the service has been interrupted and maintenance expense increased without securing proper protection by the use of fuses of too small a carrying capacity. In other words the fuse was supposed to act as a protection against lightning or high potential discharges instead of against abnormal currents. In fact, in some cases the mistake has been made of using it to the exclusion of the lightning arrester.

When determining the capacity of a fuse to be used in the protection of a specific piece of apparatus the following points should be considered:

1. The amount of current which the fuse must carry continuously under normal conditions.
2. The amount of current which the wiring or apparatus can carry for a given time without undue heating or injury.
3. The possible sources of trouble from other circuits of high potential.

Having determined these points a fuse of suitable carrying capacity can be used which will afford the desired protection without causing excessive maintenance costs or frequent interruptions to the service.

In view of the fact that most aerial circuits are exposed to both lightning strokes and crosses with foreign circuits carrying large currents or high voltages, it is customary and, in fact is necessary, to provide both the lightning arrester and the fuse.

In the protection of telephone lines and apparatus it has been customary, where the lines are entirely removed from possible contact with foreign circuits, to use the lightning arrester only. Owing, however, to the rapid extension of the electric light, electric railways and the building of high-tension transmission lines it is now considered advisable to install both the lightning arrester and the fuse in order to provide adequate protection for any conditions which may arise in the future.

The standard method of protecting apparatus is to bring the line wires through the fuses to the lightning arrester and from there to the apparatus to be protected. With this arrangement, using properly proportioned fuses and lightning arresters, high potentials are removed from the line by the open space protector without blowing the fuses, unless the current flowing over the circuit is in excess of the predetermined safe amount, in which case the fuses blow and disconnect the apparatus from the line carrying the dangerous current, thus preventing damage.

THE LOCATION OF PROTECTORS.

The proper location of protectors in the circuit has been regarded as open to discussion. Opinions differ as to whether they should be placed on the poles or cross arms adjacent to the line wire or in the offices, or the relay or signal cases. It is believed by many that the lightning arresters should be located as close as possible to the line wire, because from this position the ground wires can be run to earth by the shortest route and with the minimum number of bends, and, also because it places the protector nearer the source of trouble. There is in favor of the inside location facility of inspection and promptness of repair, tending to reduce maintenance expense and interruption of service. Objection may be raised to the pole location where long pans of wire are used to connect line wires to the apparatus. Under such conditions it is possible, although improbable, that these wires may become crossed with other circuits, or struck by lightning.

LIGHTNING ARRESTER GROUNDS.

The methods employed in obtaining a satisfactory ground, vary in different parts of the country and numerous devices have been put on the market for this purpose. The use of a galvanized iron ground rod is common among the telephone companies. Such rods should be driven to reach earth permanently damp. Another practice is to bury a coil of wire or a copper plate at such depth as to make contact with damp earth. It has been thought that the use of charcoal or coke around the ground plate would be advantageous on account of their quality of retaining moisture. Some railways have used cinders from the front end of locomotives for this purpose. It is believed, however, that the use of cinders is not as satisfactory as charcoal, because cinders, and coke as well, contain certain acids which may affect injuriously the ground plate or the connecting wire. Another important consideration is that the connection between the wire and the plate should preferably be brazed or riveted, as the use of dissimilar metals may cause electrolytic action at the point of contact which may eventually cause a disconnection between the ground wire and the plate.

The wire used in making connections between protectors and the earth should be of size sufficient to stand any mechanical strain that may be placed

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upon it, and should be run as directly to the earth as is possible, with the minimum number of bends. Where the direction of the wire must be changed, it is preferable to gain that result by a long curve rather than by a sharp bend, as lightning discharges are often deflected by sharp turns from the ground wire to adjacent objects. Where the ground wire is run through iron pipe standards, the pipe must be electrically connected to the ground wire at the point of entrance.

The Economy of Line-Time.

BY D. MCNICOL, ELECTRICAL ENGINEER, NEW YORK.

"Line-time," says the author in the *Postal Telegraph*, refers to the amount of time in hours and minutes that a circuit actually is used in handling a given number of telegrams, or given amount of telegraph matter.

It is the object in this article to point out some of the ways in which operators assigned to the operation of circuits may very effectively aid in conserving line-time.

In order more clearly to understand the importance of maintaining constant and uninterrupted operation of circuits, let us consider the analogy of a railroad train operated on a time schedule. On an important run, a competent and experienced engineman has either a regular or a special schedule to observe, and his standing as the "man for the job" is invariably dependent upon how closely his performance accords with the requirements of the schedule. Assuming that the other departments of the organization have done well their work and that the engineman has been provided with a good engine and has been given a safe and clear track; bringing the train to its destination on time means that the engineman has been on the alert during the entire trip and in the various operations of oiling, taking water, coaling, station stops, etc., has not taken a minute more time than was necessary to perform these functions.

As these remarks concern principally the economical operation of circuits where generally there is a sufficient amount of traffic available to keep them supplied, it might be said that each such circuit has a schedule.

The regular equipment used in duplex operation and on the polar sides of quadruplexes is capable of handling sixty words per minute in each direction or one hundred and twenty thirty-word telegrams per hour, or 960 telegrams in eight hours. Of course, there is a wide margin between what the equipment is capable of handling and what it is possible to transmit by the Morse manual method, but it is the fact that this margin exists which prompts the suggestion that the systematic conservation of line-time, might in numerous instances curtail the discrepancy.

We might with considerable profit consider the methods employed by our confrères in charge of the operation of the deep sea cables in maintaining constant operation of their lines. In cable operation there is no time lost in "balancing," or in changing shifts of operators. Transmission is continuous and the organization of staff is accommodated to meet this condition.

It has been suggested by a traffic expert that the fastest and heaviest circuits be supplied with two sets of equipment at each end of these circuits, so that when shift changes take place the relieving force might be in place to take immediate hold at the moment the relieved let go and thus avoid stopping the operation of the circuit.

It would seem, however, that there are some preliminary steps which might be taken which would tend to school us up to a proper appreciation of the importance of introducing every possible refinement which would effect savings in line-time.

The best economy in circuit operation obtains when the line is not permitted to be idle a moment as long as it is operative and while there is business on the hook.

Operators should make sure that their typewriters are in good working order before sitting in on a circuit. Circuits should not be stopped while operators insert new ribbons in their typewriters. Frequent exchange of remarks with the operator at the distant station as well as conversations carried on with neighboring operators and clerks at the home station seriously interferes with an operator's performance and results in the aggregate in great loss of line-time.

"Plain copy" tends to conserve line-time by making it unnecessary for an operator to stop to decipher or "send back."

A workable circuit is worth so much per minute as a traffic carrier as long as there are messages on the hook, and every minute such circuit is not being used to clear the hook represents inexcusable waste.

Proper supervision of repeaters promotes the efficiency of circuits and prevents lost line-time.

On a long circuit sudden weather changes on some part of it occasionally occur and so alter the electrical conditions of the line that changes in the adjustments of repeaters are necessary. Repeater attendants should "keep out" of circuits as much as possible and by taking preventive measures make it unnecessary for them to "come in." The signals passing in each direction should be listened to long enough to make sure that they are reliable. Repeater trouble should not be permitted to stop the operation of a circuit if there is another set available. Intermittent "swings" should not be allowed to slow up the operation of a circuit if there is another wire available to substitute.

Every operator, wire chief and manager can figure out ways to conserve "line-time" and we should do all we can to this end, so that those who come after us will have a hard task in devising methods of improving on our performances.

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Line Testing by Indicating Instruments.

(Concluded from page 117, February 1.)

INSULATION TESTS.

Operations No. 2 and No. 3, described under the heading "To Test a Wire," are really insulation tests, but this term is usually restricted to special tests of the same character made at specified intervals, the results of these tests being carefully recorded for immediate and future guidance in line maintenance work.

The testing station first measures the voltage of his testing battery; this may be readily done by tapping the unmarked side of the meter wedge on a grounded disc at the switchboard, while the connecting plug at the jack-box is placed in the "VM+" and "VM—" jacks in turn. The reading of the voltmeter for each of these conditions is recorded in the + or — space opposite "Testing Voltages" on the form supplied for that purpose.

The wire to be tested is opened at the distant end; ordinarily, this will be at an authorized testing point near the boundary line of the territories of adjacent testing stations. All other wires on the pole line should be connected to battery (as will be the case with working circuits) or to ground, if possible, while these tests are being made. At the testing station the meter wedge is inserted, with its marked side outward in the switchboard spring-jack of the wire to be tested. The connecting plug is placed in the "VM+" jack of the jack box which makes the connections as per Fig. 3. The voltmeter needle will be deflected to the right. The deflection to be recorded is the highest scale reading reached by the needle; that is, if the needle begins to climb upward as soon as the connection is made the reading shall not be taken until it comes to rest, but in a case where the needle swings to a high deflection at first and then gradually settles down to a lower point the first reading would be the correct one. These remarks do not apply to the "static kick" sometimes noticed when testing a very well insulated line, which is a sharp sudden throw of the needle occupying but a small fraction of a second at the instant the connection is made; this should be disregarded. The reading having been taken as above, it is recorded on the form, in the "Voltmeter Deflections +" column.

The connecting plug is then transferred to the "VM—" jack, which will cause a new deflection of the voltmeter to the left. This is read in the same way as for the + test described above, and then recorded in the "Voltmeter Deflections —" column of the form.

The above operations are performed in turn upon each of the wires to be tested, and the readings recorded, as stated, in the "+" and "—" columns. This completes the actual tests. The only remaining work is to fill out the other columns of the form for any wires on which the deflections indicate an insulation resistance lower than 100 megohms per mile. In making insulation tests, the conditions are as shown in Fig. 10, that is, the current from the testing battery passes through the voltmeter and out over the wire under test; but the latter being open at the distant end, the current is compelled to return through the leakage paths as shown by the dotted lines. These paths will be formed by anything in contact with the wire; each insulator and support allows a slight leakage to occur over it, and although each path of this kind measures many millions of ohms in clear weather, the fact that there are thousands of such paths in parallel usually brings the insulation resistance down sufficiently to permit a noticeable deflection of the voltmeter needle. If some of the insulators on a line are broken, or if the wire is in contact with trees, poles, buildings or other partially conducting materials, the leakage will be much increased; i. e., the insulation resistance will be lower, and a greater deflection of the voltmeter needle will occur. By comparison of the two figures, it will be seen that the joint or combined resistance of all the leakage paths on the wire in Fig. 10 has the same position as the resistance being measured in Fig. 4. We can determine the value of this combined or joint resistance of the leakage by the formula $K = \frac{E-e}{e} \times Rv$, where

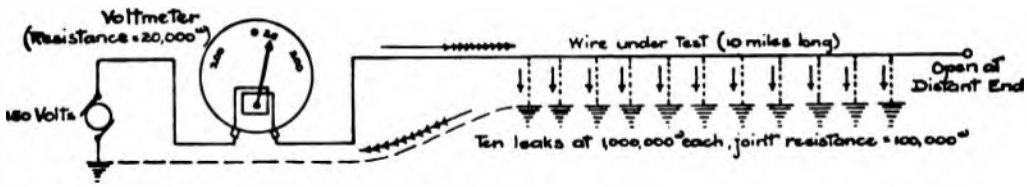

FIG. 10. INSULATION TEST.

K = Insulation resistance (or joint resistance of all leakage paths).

e = Voltmeter deflection,

E = Voltage of testing battery,

Rv = Voltmeter resistance.

In other words, we can obtain the insulation resistance of the wire as follows:

Subtract the voltmeter reading from the voltage of the testing battery; divide the remainder by the voltmeter reading; multiply this quotient by the resistance of the voltmeter.

It is sometimes necessary to determine the insulation resistance of a section of wire at a distance from the testing station, as shown in Fig. 11, where B C represents the distant section, and A B the wire connecting it with the testing station A. To do this, two insulation tests are made as described above, one with the wire open at B and the other with the

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wire cut through at B but open at C. Having calculated the two insulation resistances, we multiply these two figures together and divide the product by the difference between the two figures; the result will be the insulation resistance of the distant section, which may be reduced to "megohms per mile" by multiplying it by the length of that section in miles and dividing by 1,000,000. This is expressed by the following formulas applicable to Fig. 11.

FIG. 11. TESTING INSULATION OF A DISTANT SECTION OF WIRE.

Let K = Insulation resistance of section BC
Let K^1 = Insulation resistance of section AB
Let K^2 = Insulation resistance of entire wire ABC

$$\text{Then } K = \frac{K^1 \times K^2}{K^1 - K^2}$$

Insulation resistance in megohms per mile of section BC

$$X = \frac{K \times M}{1{,}000{,}000}$$

where M = Length of section BC in miles.

CONDUCTIVITY TESTS.

Accurate measurements of the conductivity resistance of a wire are best made by means of a Wheatstone Bridge. Where only a fair degree of accuracy is required, however, such measurements may be made with greater speed by the voltmeter-ammeter method as follows:

The wire to be tested is grounded at the distant end; and at the testing station a first or second potential battery tap is applied by plugging in the proper disc at the switchboard. The mil-ammeter is then connected in the circuit by inserting meter wedge, marked side outward, in the line spring-jack, while the connecting plug is placed in the "AM" jack at the jack-box. The connection will then be as per the full lines in Fig. 12, and the meter reading will show the strength of the current flowing in milli-amperes. This reading is noted and the meter wedge withdrawn from the line spring-jack; as the resistance of the mil-ammeter is less than one ohm, this does not appreciably alter the current flowing. The connecting plug is transferred to the "VMG" jack at the jack-box, and the unmarked side of the meter wedge is tapped on the line side of the switchboard spring-jack of the wire under test, without opening or otherwise disturbing the connections. This will make the conditions as per the dotted lines in Fig. 12, and the deflection of the needle will indicate the voltage used in causing the current previously noted to flow in the line; this voltage being somewhat lower than the potential of the battery applied, owing to part of the latter being used in forcing the current through the lamp resistance, etc. From the above current and voltage readings, the resistance of the wire is calculated by Ohm's law, i. e., the voltage is divided by the current to get the resistance. As the current reading is in milliamperes, it must be converted into amperes before making the calculation, or else the result must be multiplied by 1,000. In other words,

$$\text{Ohms} = \frac{\text{Volts}}{\text{Amperes}} \text{ or Ohms} = \frac{\text{Volts}}{\text{Milli-amperes}} \times 1{,}000.$$

It should be noted that the current and voltage readings must be taken as nearly simultaneously as possible to avoid errors.

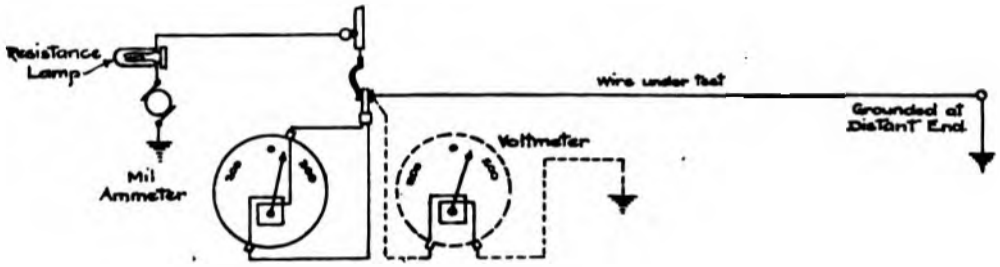

FIG. 12. DIAGRAM OF CONNECTIONS OF CONDUCTIVITY TEST.

Overhead Line Construction.—The overhead line construction committee of the National Electric Light Association, acting in co-operation with committees of the Maintenance of Way Association, the American Street and Interurban Railway Association and the American Institute of Electrical Engineers and a representative of the American Telephone and Telegraph Company, has prepared for general acceptance a set of specifications for overhead work. The specifications apply to overhead electric light and trolley line crossings (except trolley contact) over railroad rights-of-way, and the tracks and lines of wires situated thereon, and also to overhead electric lighting and transmission wires of over 5,000 volts constant potential crossing or constructed over telephone, telegraph or other similar lines. The committee, of which Mr. Farley Osgood, of the Public Service Corporation, Newark, N. J., is chairman, has requested that all persons interested in such specifications communicate to the chairman any suggestions that they may care to make.

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Enemies of the Telegraph Pole.

BY GEORGE DENISON, SALT LAKE CITY, UTAH.

In Telegraph and Telephone Age of December 16, 1910, Mr. C. T. Day, assistant superintendent of telegraph of the Sonora, Mexico, railway, gives an account of his troubles with the Mexican woodpeckers.

The Mexican railway company has probably thought of, but likely has not tried the cement pole. This would be a certain, but expensive remedy, since a few taps on a reinforced concrete pole would jar the finer sensibilities of even one of these voracious Mexican hammerers. However between the stone pole on the one hand and the shot-gun as the further limit, there are several devices available.

The most economical plan is to cover the wooden poles with a wire netting of half-inch square mesh. The birds will not dig far into a pole thus covered. I tried this on the old Fort Laramie-Fort McKinney line in Wyoming, where the yellowhammer and red-headed woodpecker had destroyed miles of poles. We found one disadvantage, however, to the use of wire netting. Our wires were frequently grounded by the netting when they had broken away from the insulators and swung against the pole. We also found a number of young woodpeckers that had hanged themselves by forcing their heads through the mesh, while reaching after real or imaginary grubs. A twenty-foot pole can be covered with netting for 6 cents, not including the expense of labor.

We also tried another device for stopping this ruinous waste of poles. We hung a bird-trap to every pole from the lower cross-arm—a cheap bird-cage, with doors that swing inward only—and for a decoy, we placed in the cage a stuffed redhead or yellowhammer swinging in the center ring like a canary. These we obtained for $2.50 each from a taxidermist at Laramie, Wyo., who mounted them with very life-like fiery red glass eyes. This method is, perhaps, too expensive, although it comes within the shot-gun limit laid down by Mr. Day, since, in addition a lineman must be maintained every eight miles. That is about the length of line one man can properly take care of, as he has to climb poles, and remove and kill the ensnared birds.

Another cheap and effective method is to maintain at each end of the line a James phantoplex motor, run at its highest voltage. The rapid alternations seriously affect all bird-life, and on the Santa Fe line between Los Angeles, Cal., and Albuquerque, N. Mex., not a single pole has been lost to the wood-peckers in the last twenty-five years.

Several attempts have been made to utilize the rapid and musical tap of the wood-pecker as a transmitter of telegraphic dots and dashes; but with varying success, since it is almost impossible to train either species to make either a long or short dash, and while the letters E I S and H are made with little difficulty, a letter P or figure six seems to be a signal for an interminable string of dots the bird frequently making as high as twenty-five or even thirty taps, and it is safe to say it will not for some time displace or antagonize the Mecograph or Vibroplex:

"The Hills were brown; the Heavens were blue;
A Woodpecker pounded a pine-top-shell,
While a partridge whistled the whole day through
For a rabbit to dance in the chapparelle;
And a Grey Grouse drummed; All's well, All's well."

Burnettized Creosoted Butt Poles.

A lumber company in Texas is treating poles by a new process which, it is claimed, adds to the life and strength of the poles and makes them superior to cedar in all respects.

At the company's works are steel cylinders 126 feet long by six feet in diameter, into which the poles are placed. By the use of steam pressure and vacuum the liquid sap is completely extracted from the wood. The entire pole, from end to end throughout its innermost cells and cell walls, is then, under high pressure, impregnated with a strong solution of chloride of zinc, which is a powerful antiseptic. The pole is then dried out thoroughly, after which process, that section from the butt end to a point from ten to eighteen inches above the ground line is impregnated by pneumatic pressure with creosote, the most powerful wood preserver known to science. This treatment it is believed will give an average service of not less than twenty to twenty-five years, or many years in excess of the average life of cedar poles. Poles treated in this manner carry the natural color of the wood above the creosoted butt section and weigh slightly in excess of cedar poles of equal size. The objections to the fully creosoted pole have been practically avoided, and those who have tested the Burnettized creosoted butt pole it is stated recommend it as superior to any pole on the market.

Damage to Chestnut Poles by Wood-boring Beetles.—The United States Department of Agriculture has issued a bulletin giving an account of the damage done to the bases of standing chestnut telephone and telegraph poles by the grub or larva of a wood-boring beetle, and the practical methods of preventing such damage. Much of the damage reported was in Maryland and in some of the Southern states. Poles treated by a creosote "open tank" method of impregnation and by brush treatments with creosote and carbolineum resist the attacks of these insects.

Multiple Telegraphy.—Experiments have been made at Florence, Italy, with an apparatus invented by an Italian engineer named Andreini, in which vibrators of different frequencies are employed to transmit ten to fifteen messages simultaneously on one wire, the messages being sorted out at the receiving end by means of suitably-tuned receivers.

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A Question of Wages.

A Chicago newspaper has asked the question, "Is $1,000 a year a sufficient wage for the average clerk?" and is printing the replies received from many of its readers. Mr. E. C. Dodge of the Western Union Telegraph office in that city contributes a sensible statement of his view of the subject. He says: "I agree with my colaborer of years ago, Mr. A. R. Urion, former president of the Board of Education, that it is purely a matter of the individual, and my experience as an average clerk under the almost constant observation of the late Philip D. Armour, whom I consider was one of the greatest executive men who ever lived, thoroughly convinced me that every man, sooner or later, strikes his level and his success depends wholly upon his ability to recognize an opportunity when one comes his way. Luck is a word which has no place in a man's life—a man who expects to succeed. Whenever he sees the word he should promptly prefix the letter 'P' and go ahead fighting his way up to the front.

"The average clerk goes about the task assigned to him about as the common laborer goes about the task of sawing a cord of wood. He looks at the wood and then at the clock and these are the only things he thinks about. If his task is doubled he wastes more time in growling about it than it would take him to do the work. The successful clerk and the one who slides quickly out of the average class is the one who meets any extra demand made upon him cheerfully and sets about finding a quicker and better way of doing things. If he is employed by a man who is broad enough to allow suggestions from employes and who appreciates honest efforts to increase in efficiency he will find that a little study of methods on how to improve and the courage to take the initiative when he gets an idea will soon put him beyond the average clerk and he will never have to ask for a salary increase."

Wireless in the Navy.

The annual report of the chief of the Bureau of Equipment, Navy Department, states that improvement in the equipment and efficiency of wireless telegraph installations has been steady and satisfactory. Modern high-frequency apparatus is being purchased for a number of vessels and shore stations. The results of tests indicate that ten and twenty-five-kilowatt sets are better suited for shore stations, where suitable higher antennæ of greater capacity can be used. Several sets of portable wireless telegraph apparatus have been manufactured for test on the cruisers *North Carolina*, *Montana*, and *Chester*. These are intended to be used during battle, the maximum range to be in the neighborhood of twenty miles.

It is proposed to use steel towers along the coast wherever possible, especially in the tropics. The number of messages handled has increased steadily. Storm warnings, weather reports, and time signals are sent out broadcast as often as obtained, also notices of obstructions to navigation, changes of lights, etc. A modern high-powered station has been installed at Colon, Canal Zone. This station has given very satisfactory results and is able to communicate with Key West every night in the year except in the summer months when static conditions make communication in the tropics irregular. Other stations of similar power are to be erected at Key West and on the island of Porto Rico. It is expected that these stations will afford constant communication between the United States and the stations at San Juan, Guantanamo, and the Canal Zone.

Combined Fire Alarm and Telephone.—A patent has been issued to Mr. W. W. Dean of Elyria, Ohio, for a combined common battery telephone system and alarm system. In applying the alarm system, two relays are introduced at the central office, one on each side of each subscriber's line. If these act in unison they counteract each other. If, however, one fails while the other acts the alarm-recording device is used to operate. At the subscriber's station the code wheel of the alarm box causes simultaneous grounding of both line limbs. When the telephone calls the signals are over a metallic circuit and both alarm control relays operate in unison. When the alarm code wheel is tripped only that control relay operates which is upon the battery side of the line. The other fails as it is connected between two earth connections.

Convention of Cedarmen's Association.

The fifteenth annual meeting of the Northwestern Cedarmen's Association was held in Minneapolis, Minn., January 10 and 11. Twenty cedar producers were represented at the convention and the stock report of present poles on hand showed a decrease of nearly forty per cent., or 800,000 pieces, compared with the stock of a year ago. All sizes are thus cut down to a point where, with reasonable trade for the next few months, the old stocks will be well cleaned up before the new stock is in shipping condition.

The estimated production for the present season indicates a total of about 600,000 pieces from the twenty-foot lengths up. If this estimate is correct the available supply will still show a shrinkage of 200,000 poles. In any event a sharp decrease in stocks on hand during the coming season is predicted by the pole men.

Race Prejudice in the Far East.—Mr. Melville E. Stone, general manager of the Associated Press, New York, is the author of an interesting article in the National Geographic Magazine, for December, 1910, entitled "Race Prejudice in the Far East." Mr. Stone says: "It is not the Asian who needs educating; it is the European. I am not worrying half so much about the heathen in his blindness as I am about the Christian in his blindness."

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Kansas Public Utilities Commission.—A bill has been introduced in the Kansas House of Representatives to change the name of the State Board of Railroad Commissioners to "Public Utilities Commission of Kansas," and to give the commission full power and authority to supervise and control all public utilities and all common carriers doing business in Kansas.

Another bill has been introduced in the House providing for a license or excise tax of two per cent. on the gross receipts of telegraph and telephone companies. Other bills affecting these interests are also before the legislature. The first named bill, although an administration measure, will probably be greatly amended, as there is a strong opposition to its important provisions. An effort will be made by the opposition to eliminate the appointive power of the governor in the selection of commissioners by providing that they be elected by the people.

Public Service Commission for State of Washington.—A bill has been introduced in the Washington legislature to create a commission to regulate public service utilities in that state, including telegraph and telephone companies.

A Jokér in Jail.—A telegraph operator in a western city was recently arrested as the result of a joke he tried to play upon the public. He inserted an advertisement in the newspapers, offering to send art lovers an excellent likeness of George Washington for the sum of ten cents. Then he sent his patrons a two-cent stamp, bearing the likeness of the father of our country. Some of them did not appreciate the joke and had him arrested. The joke is now on the joker.

Mr. B. P. Hancock, district traffic superintendent, Jacksonville, Fla., in a recent letter to our Jacksonville agent, says:

"It does seem to me that with the splendid opportunities now afforded by the telegraph service that our younger men especially should strive to qualify themselves in a technical way for advancement."

If this fact were forcibly brought to the attention of the younger members of the profession who are seeking knowledge and, naturally, promotion, it might have some influence in determining them to subscribe for Telegraph and Telephone Age. We publish a paper that is strictly educational in character and furnishes the proper material that will enable a telegraph man to fit himself for better positions.

Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway Company's Telegraph, Montreal, in remitting for another year's subscription for Telegraph and Telephone Age, writes: "I find that I must continue this subscription in order to keep posted properly on the progress in the telegraph field."

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.]

(15) Q. Is the potential of the earth the same at all points on the earth's surface? A.

A. Normally, it is within narrow limits. It has been found, however, that at widely separated points there is a difference between the earth's potential at those points. This difference of potential is the cause of so-called earth currents on telegraph lines.

(16) Q. What is the effect of heat upon the conductivity of wires? T. E. O.

A. The conducting power of metals is decreased by the action of heat, the decrease being approximately proportional to the increase of temperature. An exception to the law is carbon, which is a better conductor when it is heated to a red or white heat than when it is cold. The resistance of some alloys is little affected by moderate changes of temperature. This is the reason for using alloys for the construction of resistance coils.

(17) Q. What is the meaning of the word potential, and what is zero potential? W. H.

A. The most general meaning of potential is a condition with power to do work. If there is no power to do work, there is no potential. The electrical potential of the earth is assumed to be neutrality or zero, therefore, zero potential means that of the earth. A body charged positively is said to be at a higher potential than the earth, while a negatively charged body is considered as having a potential lower than that of the earth.

Selector Bulletins.—The United States Electric Company, New York, has issued two bulletins, No. 401 being devoted to the Gill selector in message service and No. 501 to Gill selectors for telephone train dispatching. Both are liberally illustrated with general views of the apparatus and diagrams of circuits, and replete with information on the subjects considered. The bulletins are models of the printers' and engravers' arts, and copies can be obtained by those interested on application.

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. Both the Western Union and Postal Telegraph-Cable Companies were swamped, and their facilities were taxed to the utmost. They managed to handle the business with little friction, however, and made a record that will not be easy to beat. It is stated that a total of 40,000 telegrams were received by President Taft in this campaign.

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Destruction of Poles by Woodpeckers.

In recent issues of this paper have appeared articles on the subject of damage done to telegraph poles by woodpeckers. These birds are evidently in search of food when they attack poles, but it is also evident that the supply of larvae, on which they feed, must be very limited on poles. It has been suggested that the humming of the wires may sound to the birds like the noise of insects within the wood, and in their efforts to reach the supposed insects they injure and frequently destroy the poles.

The damage is serious in many parts of the country, and in other sections there seems to be no trouble of the kind. In a general way it may be stated that the greatest damage is done in warm climates.

In our issue of December 16, 1910, Mr. C. T. Day, assistant superintendent of telegraph of the Ferrocarril sud-Pacifico de Mexico, Empalme, Mexico, described the damage done to poles by woodpeckers in that country. He stated that the birds do not avoid creosoted poles as would be supposed, but, in fact, grow fat on the creosote regimen.

With a view to ascertaining the extent of damage done to telegraph poles throughout the country from this and other causes we asked the superintendents of telegraph of many of the railroads and others, to state their experiences in this regard. The substance of the replies so far received are given herewith.

Mr. Charles Selden, superintendent of telegraph of the Baltimore & Ohio Railroad, Baltimore: "Some years ago we were annoyed by the work of woodpeckers on our poles located in Ohio, Indiana and Illinois, where we had rebuilt with cedar, and a number of the birds were shot. Since that time we have had very few cases where the birds have attacked the poles and we never have suffered from them where our poles were chestnut, so that with us it is not at all a serious question. Once in a great while there may be a pole in the states named that is attacked and we have to assume in that case tht it was wormy and the birds were seeking food. It would appear also that some of our cedars were wind-falls and though appearing all right were breeding places for worms or larvae."

Mr. W. F. Williams, superintendent of telegraph, Seaboard Air Line, Portsmouth, Va.: "We have not been materially troubled by woodpeckers, but we have found that poles are being attacked at the ground line by an insect or worm, which attacks the chestnut poles especially. So marked is this becoming, that at our request, Professor Thomas E. Snyder of the Department of Agriculture, investigated and examined quite a number of these poles and has written a pamphlet on the subject. Professor Snyder not only examined quite a number of poles on the Seaboard Air Line, but a number on the Norfolk & Western Railroad in the vicinity of Petersburg, Va. He recommends a compound of creosote, etc., to be applied to poles perhaps two feet above the ground and as far under the ground, as a probable remedy."

Mr. W. J. Camp, electrical engineer, Canadian Pacific Railway Company's Telegraph, Montreal, Que.: "I would say that on the line through the Crow's Nest Pass and the Rocky Mountains, the original pole line (cedar) was affected to a considerable extent by woodpeckers, there being hardly a pole for miles which did not have at least one hole bored into the heart. Outside of this line we have had practically no trouble from woodpeckers, only an odd pole being attacked now and then. I am inclined to think that they only bore into poles which are worm eaten. We have had considerable trouble on some parts of the line from black ants, which attacked the poles just below the surface of the ground and bored upwards, even into good sound wood. I am of the opinion that these ants will not attack a sound pole, but only commence their burrowing where the pole has decayed and work up into the sound portion. We are not now using preparations of any kind on our poles as preservatives. We experimented a few years ago with different compositions, but from the experience we obtained, came to the conclusion that we did not receive any practical benefit from the money expended in this direction."

Mr. W. C. Walstrum, superintendent of telegraph, Norfolk & Western Railway, Roanoke, Va.: "I have to say that we have not had any trouble to speak of from woodpeckers damaging the telegraph poles in this section."

Mr. C. B. Phelps, superintendent of transportation, Louisville & Nashville Railroad Company, Louisville, Ky.: "Wish to advise that all poles on our line are owned and maintained by the Western Union Telegraph Company, therefore we have no data on this subject."

Mr. F. S. Rawlins, superintendent of telegraph, Southern Pacific Company, San Francisco: "While we are bothered to some extent in this way in Arizona and New Mexico, our Mexican lines suffer more than any other. Mr. C. T. Day, superintendent telegraph, Southern Pacific Lines in Mexico, Empalme, Sonora, Mexico, has had a great deal of experience along this line and could no doubt give you an account that would be interesting and valuable."

[Note.—An article on this subject from Mr. Day was published in our issue of December 16, 1910, as previously stated.]

Mr. J. G. Jennings, superintendent of telegraph, Rock Island Lines, Chicago: "Woodpeckers in Oklahoma and Texas especially are second only to sleet storms in the way of damage to our poles. Jokingly, the "shot-gun" policy seems to me to be the only method to bring about relief. This, however, would prove to be so expensive, as well as not altogether successful, that it cannot be considered; for despite the vigilance of the "sharpshooters" the woodpecker would dodge the shot and get in his destructive work to a more or less extent. If there can be found a man in this big world of ours who could devise some method of annihilation of the woodpecker he would surely be entitled to the erection of a monument, even before his demise; and I feel sure that the Rock Island Lines would aid largely

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in the raising of funds for the same. We have recently erected one mile of concrete poles for experimental purposes in Oklahoma, and we are very solicitous as to how they will withstand the attack of the little bird with the penetrating bill."

Mr. H. A. Tuttle, president and general manager The North American Telegraph Company, Minneapolis, Minn.: "We are not troubled in this way or, at least, to a noticeable degree. We use no preservative, from the fact that we have not found anything in this country that would be effective, at a reasonable cost. I notice that the telephone companies are using a paint or creosote stain on the butt of the poles. Unless this can be done in the yard, at odd times, I do not think it pays. The outfit to do the work, carried along with the gang, is unsatisfactory and expensive, that is considering the cost of new poles in our country."

Mr. J. M. Walker, superintendent of telegraph, Denver & Rio Grande Railroad Company, Denver, Col.: "We are not troubled much with the feathery tribe of woodpeckers, probably due to high altitude. The human 'woodpeckers,' however, give us considerable trouble by shooting at our lines and destroying them."

Mr. E. J. Little, superintendent telegraph, Great Northern Railway Company, St. Paul, Minn.: "We are not experiencing any trouble to speak of from either woodpeckers or insects and we have not found it necessary therefore, to adopt any preventive measures."

Mr. W. W. Ashald, superintendent of telegraph, Grand Trunk Railway System, Montreal: "I have no knowledge of any damage in this part of the country caused by woodpeckers or any other bird. We use cedar exclusively for our telegraph poles, and their life varies according to the nature of the soil. We have poles on our right-of-way in very fair condition which were planted thirty-five years ago. We experience more trouble from grass fires than from any other cause. We do not use any wood preservatives."

Mr. J. B. Murphy, superintendent of telegraph, Mobile & Ohio Railroad Company, Jackson, Tenn.: "We have never had any poles destroyed by woodpeckers that I am aware of. There are but few of these birds down in this country. Presume this is accounted for by our having but few cherries, and so many peaches."

Mr. E. A. Klippel, superintendent of telegraph, Oregon-Washington Railroad & Navigation Company, Portland, Ore.: "On the lines over which I have jurisdiction we have had but very little trouble caused by woodpeckers damaging telegraph and telephone poles. There have been a few isolated cases of this kind but not sufficient to justify us to adopt any particular methods to combat this source of trouble."

Mr. W. H. Hall, superintendent of telegraph, Missouri, Kansas & Texas Railway System, Denison, Tex.: "We have had a great deal of trouble with these birds, especially on our San Antonio division between San Antonio and Smithville, Tex. During the past summer we put on about five hundred new cross arms and set quite a number of poles on account of the destructive work of the birds. I had all of the new cross arms thoroughly impregnated with creosote at our creosoting plant and have hoped that this would overcome the trouble. I note you state one superintendent of telegraph has reported that the birds get fat on creosote and this is rather disappointing. My linemen have tried almost everything to stop the destructive work of these birds. One man had trouble caused by the birds eating holes in cable boxes. He covered the holes with tin and the birds came back and pecked new holes by the side of the tin. Another lineman reports that he has killed off a number of the birds by soaking corn meal in poison and putting it in the holes, and another, who appeared to be sober when he was relating the story, but might have been telling it on the 'morning after,' stated that he had been 'hanging the varmints.' He said he took a small piece of twine, made a loop in it and hung it over the hole. When the woodpecker stuck his head in the hole his feathers became entangled in the loop, with the result that he hung himself and that the horrible example of the hung woodpecker frightened the other birds away."

Mr. J. C. Brown, general foreman, Missouri Pacific Railway, St. Louis, Mo.: "In my experience the life of poles is determined principally by grass fires, and not by woodpeckers. The various chemical conditions of the soil in which they are set is also an important factor to be taken into consideration. I have known sound white cedar poles to dry rot at the ground line within a period of eighteen months after being set, to such an extent that a slight strain would break them off. In most of the Southern states, where grass and undergrowth are abundant, right-of-way fires are most destructive to poles for the reason that poles and cross arms are usually totally consumed, and the service interrupted before knowledge of the cause is obtained. With the loss of poles and cross arms in such instances, it is often a difficult and expensive undertaking to provide and get new material on the ground to restore the physical condition of the line. White cedar poles, which are used almost exclusively in the limits of my experience, are easily ignited, and once on fire they are invariably consumed. There are territories west of the Mississippi River comprising less than seven thousand miles of poles where the destruction of and damage to poles from this cause has amounted to forty miles per annum. Spading the grass away from the base of the poles and using wooden braces for a distance of four or five feet would prevent this loss. This should be done during the months of July and August. While the woodpeckers are a source of great detriment to the strength and life of poles, we are warned by inspections from time to time just what to expect from the depredations of these birds. I recall that a few years ago, after

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a heavy lead had been prostrated by a sleet storm, and the wires were lying on the ground for a distance of sixty or seventy miles, that in many places a number of the shattered and broken poles were mere shells, having been bored and hollowed out by the woodpeckers. I also recall that several years ago, on a certain division, these birds were very numerous. As many as three or four could often be seen pecking away on one pole. The division lineman in charge of this territory was a conscientious Irishman, fertile in expedients, and when his attention was called to the apparent unnecessary destruction of poles from this cause, he seemed deeply grieved, but made no reply. Some two months later he called my attention to the matter, stating that he did not have a "peckerwood" on his division, that he had been riding on the local freight trains from one to three days per week, locating himself in the cupola of the caboose with a shot gun and had shot them by the dozen. I think this remedy about as effective as any."

(To be continued.)

The Turner Monument Fund.

One way to popularize the Turner monument project is to secure a large number of small subscriptions from the employes of railroads, connected as they are by a common bond of interest. This enables all employes, down to the lowest grade, to be represented in the movement. Mr. Charles Selden, superintendent of telegraph of the Baltimore and Ohio Railroad, has set the pace, and it would be well if officials of other roads would canvas their lines in the same manner. If this were generally done the balance required for the monument would not long remain a negative quantity.

The Turner Monument project was established for the purpose of raising a fund of $3,000 for a monument to be erected at Turner, N. Y., on the Erie Railroad, to commemorate the sending of the first telegraphic train order. This historical event took place at Turner in the autumn of 1851, the train order being sent by Charles Minot, general superintendent of the road. It has been considered an event of sufficient importance to justify its commemoration in bronze and granite and the Association of Railway Telegraph Superintendents and the Old Time Telegraphers and Historical Association have officially endorsed the movement.

Many large subscriptions to the fund have been received and duly recorded in these columns. Among these contributors may be mentioned: Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, $50; Col. Robert C. Clowry, New York, $25; John A. Roebling's Sons Company, $50; Mr. F. D. Underwood, president of the Erie Railroad, $25; Mr. Thomas A. Edison, $50; Mr. George T. Williams, formerly superintendent of telegraph Nickel Plate Railroad, Cleveland, Ohio, $25.

The following named gentlemen constitute the committee in charge of the Monument Fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

The contributions received up to date are as follows: Previously acknowledged, $888.25. Through Charles Selden, superintendent of telegraph of the Baltimore and Ohio Railroad: B. F. Kelly, St. George, S. I., N. Y., $1.25; M. E. Weist, St. George, S. I., N. Y., $1.00; L. E. Hoagland, St. George, S. I., N. Y., $1.00; D. A. McLaughlin, St. George, S. I., N. Y., $1.00; T. M. Bridges, St. George, S. I., N. Y., $1.00; F. C. Schelhorn, St. George, S. I., N. Y., $1.00; F. W. Freeman, St. George, S. I., N. Y., $1.00; J. T. Lee, St. George, S. I., N. Y., $1.00; Miss K. Crosson, St. George, S. I., N. Y., $.50; E. L. Haskins, St. George, S. I., N. Y., $.50; J. L. Foggarty, St. George, S. I., N. Y., $.50; W. L. Connor, St. George, S. I., N. Y., $.50; J. M. Troutman, St. George, S. I., N. Y., $.50; J. C. Muhlbach, St. George, S. I., N. Y., $.50; F. D. Jennings, St. George, S. I., N. Y., $.50; S. G. Eilenberger, St. George, S. I., N. Y., $.50; J. A. Larkin, St. George, S. I., N. Y., $.50; J. H. Groves, St. George, S. I., N. Y., $.50; J. L. McDonald, St. George, S. I., N. Y., $.50; A. B. Schlowsky, St. George, S. I., N. Y., $.50; T. J. Oldham, St. George, S. I., N. Y., $.50; F. A. Stoffel, St. George, S. I., N. Y., $.25; L. F. Kunz, St. George, S. I., N. Y., $.25; E. R. Burke, St. George, S. I., N. Y., $.25; W. J. Madden, St. George, S. I., N. Y., $.25; H. C. Spencer, St. George, S. I., N. Y., $.25; B. F. Fithian, St. George, S. I., N. Y., $.25; J. M. Hughes, St. George, S. I., N. Y., $.25; J. P. Klinger, St. George, S. I., N. Y., $.25; J. P. Tully, St. George, S. I., N. Y., $.25; W. E. Connell, St. George, S. I., N. Y., $.25; R. J. Cromie, St. George, S. I., N. Y., $.25; C. R. Klinger, St. George, S. I., N. Y., $.25; L. A. Francis, St. George, S. I., N. Y., $.25; J. B. Every, New York, $5.00; Manhattan Electrical Supply Company, New York, $25.00; G. C. Kinsman, Decatur, Ills., $5.00. Total, $941.25.

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The Telephone.

The Telephone in Ecuador.—The Guayaquil Telephone Company is about to convert its system to common-battery working at a cost of $125,000.

Interchange of Telephone Connections in Indiana.—A bill has been introduced in the Indiana legislature to compel telephone companies to provide interconnection between their systems on demand of a subscriber.

Shooting at Overhead Cables.—The Pacific Telephone and Telegraph Company has suffered much damage to its overhead cables in the vicinity of Portland, Ore., and in other sections by sportsmen shooting at them or at birds. Inspectors are patrolling the lines and offenders, if caught, will be prosecuted.

Telephone Amalgamation in Glasgow.—Preparatory to the amalgamation on January 1, 1912, of the post office and National Telephone Company's systems in Glasgow, Scotland, 1,600 National subscribers have been transferred from the company's exchange to the post office central exchange. The two systems have been interconnected, a small fee being charged for this service. Small users find this arrangement cheaper than paying for two separate services.

Telephony in Denmark.—The Danish Telegraph and Telephone Act provides, in principle, for the exclusive right of the State to work the telephone system, but it gives the Government the right to grant concessions for the working of telephone systems to private companies. The Government supervises the companies and fixes the maximum rates. The peculiar geographical conditions of the country has made the arrangement quite natural of forming a company for each individual part of the country, while the connection between the different parts mutually, as well as with foreign countries, is worked by the State.

The Interstate Telephone and Telegraph Company.—Mr. Adam S. Clow, secretary of the Interstate Telephone and Telegraph Company, Chicago, states that it is probable that the system of his company and that of the Illinois Tunnel Company will be connected and that an effort will be made by the receivers of both companies to have the United States judge in whose court the bankruptcy proceedings are pending grant the companies the right to effect such an arrangement.

A. C. Sands, district manager in western Washington for the Pacific States Telephone and Telegraph Company, died in North Seattle, Wash., December 22. He was 60 years of age. He was a practical telephone man and superintended the building of telephone lines in Alaska in 1898.

Telephone Rates in Chicago.

The order of the City Council of Chicago directing its expert to draw up a lower schedule of rates is declared by President B. E. Sunny, of the Chicago Telephone Company, to be unfair and a statement has been made by him that the lower rates would not be accepted.

This decision of the council as to rates is the outcome of the report made by Mr. W. J. Hagenah, chief telephone expert of the city. The committee adopted the recommendations of its investigators fixing the value of the company's plant at about $22,000,000, reducing the payments to the American Telephone & Telegraph Company $147,000, establishing a depreciation fund of five and one-half per cent. and a dividend of eight per cent. and distributing a surplus of $216,168 by a reduction of rates.

The Telephone in Japan.—The twentieth anniversary of the establishment of the telephone in Japan was celebrated on December 16, 1910. In 1890, the year of commencement, there were only sixteen stations and two exchanges throughout the whole country. Ten years later these numbers had grown to seventy-four and twenty-five respectively, and there had been added four automatic telephone exchanges. The figures for 1910 are 1,568 stations, 708 exchanges and 484 automatic telephone exchanges. In 1890 there were only 343 subscribers; in 1900, 11,668, and in 1910, 126,720. So far a sum of $11,500,000 has been expended by the Japanese Government on its telephone system, but in view of the fact that there are at present over 42,000 people waiting to have the telephone installed in their premises, it is proposed to increase the 1911 appropriation from $2,250,000 to $3,250,000.

Energy Required for Telephonic Conversations. Mr. John J. Carty, chief engineer of the American Telephone and Telegraph Company, states that the energy consumed per 1,000 telephone conversations, under the usual operating conditions of the American Telephone and Telegraph Company, is about 950 watt-hours, which is equal to the consumption of eight and one-half pounds of coal. Assuming that there are 9,000,000,000 conversations held in the United States per annum, which is a fair estimate, the amount of energy required would involve the consumption of about 30,000 tons of coal. It should be explained that this energy is required for the telephone power plant which furnishes the current for telephone signaling circuits, the telephone ringing machines, etc., in other words, the energy required for the operation of the telephone switchboard.

Buying and Merging Telephone Companies in New York State.—Petitions have been received by the New York State Public Service Commission, Second District, from the New York Telephone Company asking that it be permitted to buy the Amsterdam Automatic Telephone Company for $150,000, to merge the Trumansburg Telephone Company, the Jefferson County Telephone Company, and to transfer the rights, property and franchises formerly belonging to the Central New York Telephone and Telegraph Company, now owned by the New York Telephone Company, to the Otsego and Delaware Telephone Company for the sum of $98,000. The New York Telephone Company also asks to be

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permitted to sell its property in Allegany County, including the rights and privileges granted to the New York and Pennsylvania Telephone and Telegraph Company by the villages of Wellsville and Andover, to the Allegany Telephone Company of Wellsville. The price to be paid is $35,000.

Telephone Rates in Massachusetts.—Representatives of various business and improvement organizations in Boston have started a movement in opposition to the new telephone rates recommended by the Massachusetts Highway Commission. It is stated that Governor Foss will probably be asked to appoint a special investigating committee to examine the telephone system and conditions.

To Wind Up a Telephone Company's Affairs.—The affairs of the Telephone, Telegraph and Cable Company of America are to be wound up February 16. An order was signed by Vice Chancellor Emery of New Jersey directing all parties in interest to show cause why the report of Charles M. Myers and Edward M. Colie, receivers, should not be approved and an offer of $75,000 by Henry S. Kearny of New York for all assets in the hands of the receivers, barring cash assets, should not be accepted.

New York Telephone Company Bids for Continuance of Privileges.—The New York Telephone Company has applied to the Board of Estimate for a continuance of its privileges in carrying on its business in Greater New York. The company agrees to pay the city $122,000 per annum for the next five years, $134,000 a year for a second term of five years, $152,000 per annum for a third term of five years, $176,000 yearly for a fourth term of five years and thereafter $200,000 a year. The matter has been referred to the city chief engineer.

Convention of National Independent Telephone Association.—The National Independent Telephone Association began its convention in Chicago, February 8. It is stated that the delegates from the smaller companies charge that many telephone promoters counted in the past among the strongest bulwarks of the independent movement are showing themselves not averse to consolidation and friendly to the Bell camp or the J. P. Morgan interests. The American Telephone and Telegraph Company, it is reported, was represented at the Hotel LaSalle, where the meetings were held. Representatives of the Morgan interests were also present.

Long Distance Telephone Rates.—Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, states that while the telephone company is constantly giving consideration to the problem of reducing rates for long distance telephone service, no change in tolls is in contemplation or under consideration at present, it being entirely a matter of the future to show whether economies can be effected, through the use of wires for combined telephonic and telegraphic service, sufficiently to permit a reduction in the cost of transmitting long distance telephone messages.

Telegraph and Telephone System of Texas Company.—The Texas Company, an oil-producing concern, with headquarters at Houston, Tex., has an extensive telegraph and telephone system, extending from Laredo, Tex., to New Orleans and Shreveport, La., and from Kansas to Port Arthur, Tex., on the Gulf of Mexico. It has about 100 operators in all in the main offices and at the pumping stations. Mr. James R. Mayer is superintendent of the system.

Cumberland Telephone and Telegraph Company.—The annual report of the Cumberland Telephone & Telegraph Company shows the result of operations and the financial condition of the company on December 31, 1910, as follows:

Total earnings	$6,897,080	Inc..	$281,712
Operating expenses	3,894,409	Inc..	14,970
Net earnings	$3,002,671	Inc..	$266,742
Total charges	$595,403	Inc..	$16,321
Balance	$2,407,268	Inc..	$250,421
Dividends	1,574,412		
Surplus	$832,856	Inc..	$250,421

Ball of Boston Telegraphers' Aid Association.—The Telegraphers' Mutual Aid Association of Boston, Mass., held its annual dance February 3. There was a large attendance and everyone present had a thoroughly enjoyable time. Mr. Robert E. Tobin is president of the association and to his hard work the success of the affair was largely due. Mr. John B. Gatins acted as floor manager. This association has done excellent work for many years in aiding its members in time of sickness and providing burial expenses. Among the guests present were C. A. Richardson, manager, and J. D. McDonald, chief operator of the Postal Telegraph-Cable Company; superintendent C. F. Ames; J. B. Rex, general traffic chief; L. D. Wilbourn, district traffic superintendent and W. S. Barker, district plant superintendent, of the Western Union Telegraph Company and J. J. Flaherty of the American District Telegraph Company.

Proposal for Wire for Signal Service.—The Chief Signal officer, War Department, Washington, D. C., will receive bids until 11.30 a. m., February 27, for 300 miles of 11-strand field wire, to be furnished on spools in lengths of 2,640 feet, the spools to be furnished by the Signal Corps. Address Captain A. S. Cowan, disbursing officer, Signal Corps, U. S. A., Washington, D. C.

Special Ocean Mail Service Ports.—The following ports have been 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.

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Calculating Joint Resistance by the Aid of Charts.

BY THOMAS R. TALTAVALL.

The mathematical calculation of joint resistance is not often an easy task, and we are not always sure that the answer is correct unless each step of the operation is carefully checked.

A method of calculating joint resistance by the aid of a chart or diagram is given herewith. It will be found extremely useful by those having calculations of this nature to perform, and is preferable to mathematical calculations because it gives a visible record of the various steps in the solution of the problem. Too much dependence, however, should not be placed upon any mechanical means of doing brain work, because the brain needs exercise to maintain its reasoning power. The brain and the chart should work together and help each other, and one should not be used to the detriment of the other.

By the use of a chart we can accurately and quickly determine:

1. The joint resistance of two or more conductors, and

2. The component resistances of a given joint resistance.

TO DETERMINE JOINT RESISTANCE.

Assume that two wires are supplied with current by one battery. The resistance of one wire is say, 75 ohms and of the other, 50 ohms. What is their joint resistance?

To draw a diagram that will give the answer to this and other like problems, proceed as follows. First, provide a scale, the finer the divisions and the more accurate it is the better. The divisions should not be greater than one-tenth of an inch. Next, on a sheet of paper draw a horizontal line, C, for the base line. Upon this line erect two perpendiculars, A and B, at right angles to the base line, their distance apart being immaterial, so long as they are not too close to each other or too widely separated.

Upon the vertical line A, point off 50 divisions of the scale to represent the 50 ohms resistance of one wire and on the other vertical line, B, mark 75 divisions for the 75 ohms of the other conductor.

Then draw a diagonal line, D, from the 50 point on A to the base of B, and another diagonal in the opposite direction from the 75 point on B to the base of A, as shown in the diagram. The height from the base line of the point where the two diagonals cross represents the joint resistance of the two wires. This distance must be measured by the same scale used in laying off the 50 and 75 ohms. The joint resistance, as thus measured, is found to be 30 ohms.

Assume now that we wish to determine the joint resistance of three wires, with resistances of 75, 50 and 60 ohms respectively. In solving this problem the same diagram can be used.

We already have the joint resistance of the 75 and 50-ohm wires, which is 30 ohms. We use this joint resistance, G, as the foundation for further calculation.

Point off on the vertical line, B, 60 ohms in the same manner as before, then draw a diagonal from this point to the base of G, cutting diagonal D at J. The distance of the intersecting point of these diagonals measured from the base line gives the value of the joint resistance of the three wires.

The joint resistance of any number of wires can be determined in this manner.

TO DETERMINE THE COMPONENT RESISTANCES OF A JOINT RESISTANCE.

Suppose we have a conductor of 75 ohms resistance and wish to combine it with another conductor so as to obtain a joint resistance of 30 ohms, what must be the resistance of the second conductor?

Construct a diagram as before. Draw a diagonal from 50 ohms on the vertical line A to the base of the vertical line B. Then find the point on this diagonal which is exactly 30 scale-units above the base line. This point then represents the joint resistance

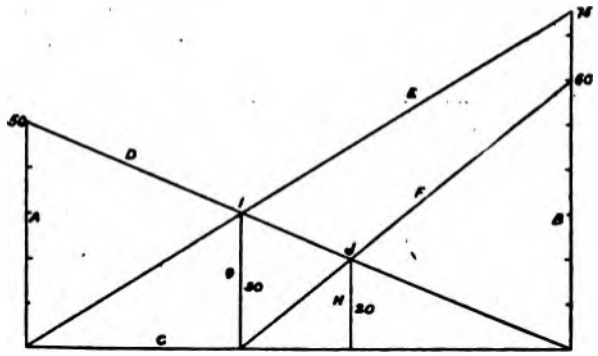

CHART FOR CALCULATING JOINT RESISTANCE.

of the wire of 50 ohms and the wire whose resistance is to be determined. Next draw a diagonal from the base of the vertical line A through the 30-ohm point on the diagonal D and project it to the vertical line B. This point of intersection with B will represent the resistance of the second conductor, which was to be determined. The value of this resistance is found to be 75 ohms.

If we desire to determine the resistance of a third conductor in order to obtain a joint resistance of, say, 20 ohms, find the point on the diagonal D, which is 20 units above the base, then draw a new diagonal from the base of G through the 20 point on the diagonal D to the vertical B. The new diagonal and the vertical B will intersect at 60, which is the resistance of the third conductor.

In solving problems of this kind it is generally more satisfactory to use cross section paper. This paper, which can be obtained of any dealer in drawing materials, is accurately ruled with horizontal and vertical lines. Cross section paper is a scale in itself, and no other scale is needed to make measurements. The separate scale and blank paper method is satisfactory if one has an accurate scale and does not mislay it. The advantage of the cross section paper is that we have scale and paper in one, where-

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as in the other method the scale and paper are separate and require extra handlings.

It will be noticed that along the verticals A and B in the drawing are little marks. They represent divisions of 10 units of the scale. Each division should be divided into 10 units, in order to obtain accurate measurements. Whether cross section paper or a separate scale is used, divisions of twentieths of an inch give very satisfactory results. Finer divisions would of course, give more accurate readings.

In the foregoing examples whole numbers were used for the sake of clearness, but the same rule applies, of course, to numbers composed wholly of fractional parts or of whole numbers and fractions. The fractions, however, should be expressed in decimals.

The divisions of the scale or of the cross section paper may be given any value. In the diagram the figures used were given a low value in order to make the principle clear, but whatever is the value of the figures in an actual case, the principle is the same. Obviously, very large quantities cannot be represented within the limits of a sheet of paper if we use the same unit for measurement that we do for quantities of low value. The way to meet this seeming difficulty, however, is very simple. If we are dealing with large quantities they can be brought within the limits of the sheet by reduction, that is, by dividing the quantities by any figure that will reduce them to workable dimensions. The resulting value of the joint resistance will, of course, represent the true value similarly reduced, and must be multiplied by the reducing factor in order to give the result the actual value.

For example, suppose the resistances 50 ohms and 75 ohms, used in the original example, had been 300 ohms and 450 ohms instead; we could reduce the values of the latter quantities by dividing them by say 6, which would give us 50 and 75 as quotients. Now we can work with 50 and 75 with advantage, as we did in the first place.

It must be borne in mind, however, that the value of the joint resistance is affected by the same number used in reducing the separate resistances. In the example given the 300 and 450 were reduced by dividing by 6. The resulting joint resistance will also represent the actual value divided by 6. Therefore, to obtain the correct value of the joint resistance we must multiply the result by 6; this will give us, in this instance, 180, which is the joint resistance of two wires of 300 and 450 ohms respectively.

It is evident from the foregoing that very small quantities can be given workable dimensions by multiplication. In a case of this kind the resulting joint resistance will be larger than the actual resistance, and must therefore be divided by the figure used in multiplying the separate resistances, to give it its true value.

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Radio-Telegraphy.

Wireless in Turkey.—The Turkish Government has established wireless telegraphy on eleven war ships and a land station.

Wireless for Submarines.—It is stated that the British Admiralty has developed a wireless system for use in submarine boats.

Wireless in Australasia.—Direct wireless communication between New Zealand and Australia has been established by the Dominion Postal authorities.

Wireless in Korea.—Wireless telegraph stations are to be established at Mokpo, Hangmunto and Sochongto, Korea, and on the customs cruiser, *Kwangche.*

Wireless News in the Amazon Country.—Porto Velho, a town on the Amazon river, in the Brazilian rubber country, has a weekly newspaper which receives its news exclusively by wireless telegraphy.

Wireless Station on Cocos Islands.—The British Government is arranging to install wireless telegraphy at the Keeling Cocos station in order that telegrams may be exchanged between passing ships and that remote region.

Wireless Institute Election.—At the meeting of the Wireless Institute held in New York, January 4, Mr. Kolster of the Radio Telephone Company read a paper on "Singing Spark Sets." The election of officers resulted as follows: President, Mr. R. H. Marriott, of New York; vice-presidents, Messrs. Greenleaf W. Pickard, of Amesbury, Mass., and Fritz Loenwenstein, of New York; secretary-treasurer, Mr. Alfred N. Goldsmith, New York, and directors, Messrs. Frank H. Fay and Sidney L. Williams, both of New York.

The Newport Wireless Station.—One of the most important wireless stations of the Navy Department is that at Newport, R. I. Another new mast will be erected in a few months and a complete new wireless equipment installed. The mast will be 186 feet high. This station has an excellent record in rendering valuable aid to vessels in distress, the most notable of these being the case of the steamships *Republic* and *Larchmont.* It was this station that had a twenty-minute conversation with Colon, Panama, recently, a distance of 1981 miles. Official messages are sent from this station to the navy department direct through the air, and can quickly flash messages to the Boston, New York, Portsmouth and other navy yards at greater distances. The one trouble this station experiences is the constant interference by amateurs and other operators, but with the new instruments this trouble will be largely obviated and the wireless business will be controlled at the torpedo station. Since Commander Mark L. Bristol, assumed charge of the station he has greatly increased the efficiency of the plant.

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

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

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

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The Railroad.

Omaha Land Show.—Dr. Frederick Millener, of the Union Pacific Railway, recently gave a demonstration of wireless telephony and wireless telegraphy in the Colorado exhibit at the Omaha Land Show. The receiving apparatus of the wireless telephone system is concealed in the hat.

Train Dispatching by Telephone on Chicago and Western Indiana Railroad.—The Chicago and Western Indiana Railroad has just ordered a complete equipment of railway telephone material. The new dispatching system will cover the entire line of this road and of the Belt Railway of Chicago, a subsidiary road. There will be three circuits. One is the train dispatching wire of the Chicago and Western Indiana lines, another the train dispatching wire of the Belt Railway and the third a message circuit paralleling the train wire circuit of both roads. A total of fifty-five way-station telephone outfits and 104 station selector outfits will be provided.

Mr. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line, Wilmington, N. C., was a recent New York visitor; also Mr. G. A. Cellar, superintendent of telegraph, Pennsylvania Lines West of Pittsburg, Pittsburg, Pa.; Mr. Wm. Bennett, superintendent of telegraph, Chicago and Northwestern Railway, Chicago, and Mr. S. A. D. Forristall, superintendent of telegraph, Boston and Maine Railroad, Boston. They came to attend the meeting of the High Tension Crossing Committee of the Association of Railway Telegraph Superintendents of which committee they are members.

Mr. Charles T. Day, has been appointed superintendent of telegraph of the Southern Pacific lines in Mexico, with headquarters at Empalme, Sonora, Mexico. Mr. Day was assistant superintendent prior to his promotion.

Mr. G. H. Groce, of the General Railway Signal Company, Rochester, N. Y., and formerly superintendent of telegraph of the Illinois Central Railroad, at Chicago, was a recent New York business visitor. He called on many of his old friends while in the city.

Telephone Dispatching on the Canadian Pacific.—The management of the Canadian Pacific Railway Company has authorized the equipment of the following telephone dispatching circuits: Calgary-Field, 136 miles; Field-Revelstoke, 131 miles; Revelstoke-Kamloops, 129 miles; St. John-Vanceboro, 94 miles; Vanceboro-Megantic, 217 miles; Montreal-Quebec, 175 miles; Brockville, Ottawa, Chalk River, 175 miles; Smiths Falls-Havelock, 110 miles; Havelock-Toronto, 107 miles; Toronto-Muskoka, 141 miles; London-Windsor, 113 miles. Total, 1,528 miles. This added to the 2,254 miles of circuit now in operation makes a total of 3,782 miles of telephone train dispatching circuits on the Canadian Pacific Railway, covering the main line from St. John, N. B., to Vancouver, B. C., with the exception of two sections worked double track and two other short sections, also various branches of single track throughout Ontario and Quebec.

Meeting of Western Division of Association of Railway Telegraph Superintendents.

The regular quarterly meeting of the Western Division of the Association of Railway Telegraph Superintendents was held at the Southern Hotel, St. Louis, Mo., January 26; chairman E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railway, presiding. There were forty-three members of the division present at the meeting, and matters pertaining to the operation and maintenance of railway telegraph and telephone systems occupied the larger part of the time in their discussion.

A committee was appointed to make the necessary arrangements for the attendance of the Western Division members at the annual meeting of the parent body in Boston, June 19 to 23. Mr. W. C. Walstrum, superintendent of telegraph of the Norfolk and Western Railroad, Roanoke, Va., was appointed chairman of this committee.

It was announced that Mr. Thomas A. Edison had promised to develop a "loud sounding telephone" for use in the railway service. The receiver is to be of such construction that a voice speaking at the other end of the wire can be heard all over the room.

According to a statement made by Mr. Chenery, 35,000 miles of railroad have been equipped with telephones in place of the telegraph for train dispatching. There still remain 240,000 miles of road to be equipped with the telephone system.

Mr. C. S. Rhoads, superintendent of telegraph, Cleveland, Cincinnati, Chicago and St. Louis Railway explained the application of the telephone in manual block circuits on his line. Where such stations are from four to five miles apart, they have secured excellent results on a grounded circuit by the use of an adjustable coil bridged around the receiver, making the circuit comparatively quiet, notwithstanding the fact that such circuits were paralleled by high tension trolley and power circuits.

Some proposed amendments to the constitution were presented and will be acted upon at the annual convention. These amendments relate to proper handling of applications for membership in the event a full attendance of the Executive Committee is not had.

The members and guests were entertained at luncheon by the supply man present, and in the evening were the guests of Mr. M. T. Cook, division commercial superintendent of the Western Union Telegraph Company at a banquet at the Jefferson Hotel.

A letter from chairman E. P. Griffith, of the Turner Monument fund committee was read and every member present urged to lend his assistance towards swelling the funds sufficient to carry out the purpose of the committee.

Some discussion was had with reference to legislation in which the telephone was a conspicuous factor. In some states bills have been introduced restricting the use of the telephone for the giving of train orders; in others, providing that train or-

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ders shall not be issued to train men, the purpose being to prevent train men from securing orders at blind stations, etc. Legislation in other states provides that telephone service must be installed in all depots where the railway company employs an agent. The effect of these various proposed laws was discussed.

Meeting of High-Tension Committee of Railway Telegraph Superintendents.

A meeting of the High-Tension Wire Crossings Committee of the Association of Railway Telegraph Superintendents was held at the Waldorf-Astoria, New York, February 7, to consider the general situation. The members of the committee are: Mr. G. A. Cellar, superintendent of telegraph, Pennsylvania lines west of Pittsburg, Pittsburg, Pa., chairman; Mr. G. H. Groce, General Railway Signal Company, Chicago; Mr. W. W. Ashald, superintendent of telegraph, Grand Trunk Railway, Montreal; Mr. W. P. Cline, superintendent of telegraph, Atlantic Coast Line, Wilmington, N. C.; Mr. Chas. Selden, superintendent of telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; Mr. C. A. Parker, superintendent of telegraph, Denver, North Western and Pacific Railway, Denver, Col.; Mr. J. M. Walker, superintendent of telegraph, Denver and Rio Grande Railway, Denver, Col.; Mr. Wm. Bennett, superintendent of telegraph, Chicago and Northwestern Railway, Chicago; Mr. S. A. D. Forristall, superintendent of telegraph, Boston and Maine Railroad, Boston, Mass.; and Mr. J. G. Jennings, superintendent of telegraph, Chicago, Rock Island and Pacific Railway, Chicago, Ill. The members present were Messrs G. A. Cellar, Wm. Bennett, S. A. Forristall and W. P. Cline.

A joint committee of the National Electric Light Association, the American Railway Engineering and Maintenance of Way Association and the American Electric Railway Association is preparing an overhead crossing specification applicable to practically all aerial crossings of electric power wires over telephone or railway systems, and suggestions and criticisms are invited from all persons interested before the final adoption of the specification. The telegraph superintendents met the National Electric Light Committee and they discussed the subject together. Satisfactory progress was made.

Boston Meeting of the Association of Railway Telegraph Superintendents.

Active preparations are going forward for the next annual meeting of the Association of Railway Telegraph Superintendents which is to be held in Boston, June 19 to June 23. The committee of arrangements, of which Mr. S. A. D. Forristall is chairman, is arranging an excellent programme of entertainment, and as there is much to be seen in and around Boston, the attendance will probably be large. The papers to be presented will be of a most practical character, and it is hoped that the members will come prepared to discuss the subjects brought to their attention. It is desired to make this meeting the most profitable and interesting ever held by the association. The headquarters will be at the Hotel Brunswick. Additional information can be obtained from the secretary, Mr. P. W. Drew, Minneapolis, St. Paul and Sault Ste. Marie Railway, 204 Clark Street, Chicago.

Annual Dinner of Commercial Cable Company's Staff.

The tenth annual dinner of the staff of the Commercial Cable Company was held at the Hotel Grenoble, New York, January 28, superintendent S. F. Austin presiding. Among those present besides Mr. Austin, were Mr. Clarence H. Mackay, president; Mr. George G. Ward, vice-president and general manager; Mr. Albert Beck, secretary; Mr. C. E. Merritt, assistant treasurer; Mr. F. H. Dennis, superintendent of Clearing House; Mr. Charles Priest, electrician and Morgan Williams, Thomas Drew, E. L. Cohn, W. J. Gaffney, W. Beynon, J. F. Power, L. S. Fisher and others, about 100 in all.

In his opening address, Mr. Austin's sympathetic reference to the late general superintendent S. S. Dickenson found the sentiment of his audience. Mr. Mackay gave an interesting talk in which he referred in complimentary terms to the personnel of the staff. Unfortunately Mr. Ward was suffering from a cold and complete loss of voice, therefore his response to Mr. Morgan Williams' toast to the "Executive" was read by Mr. Austin. Mr. Cohn amused the company with his native wit. Mr. Drew in an address on "Co-operation" made an excellent impression. The musical numbers contributed by Messrs. Gaffney, Beynon and Power, with Mr. Fisher at the piano, were received with much favor.

Telegraph Taxation in Maine.—An act providing for the taxation of telegraph companies at the rate of 2½ per cent. of the value of their lines and other equipment has been presented to the legislature. This tax, the bill stipulates, shall take place of all state and municipal taxes.

Serial Building Loan and Savings Institution.

A dinner of the officers and directors of the Serial Building Loan and Savings Institution, New York, was held at the Astor House on the night of January 27, all of the directors being present. Plans and provisions were discussed, looking to the expansion of the institution's business during the coming year. Among those present were: Mr. E. S. Butterfield, treasurer; Mr. Edwin F. Howell, secretary; and Messrs. Thomas M. Brennan, William J. Quinn, M. J. O'Leary, Thomas E. Fleming, C. A. Kilfoyle, G. W. Blanchard, Edward Reynolds, M. S. Cohen, E. E. Brannin, M. W. Rayens, H. A. Konninger, J. T. Laidlaw and W. B. Dunn, directors. President A. G. Saylor was unable to be present on account of illness.

An optimistic spirit prevailed in the Board, which was encouraged by reason of the fact that the year 1910 shows the largest net increase of shares since the year of organization, 1885. The association's affairs are in excellent condition.

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Hard Drawn Copper Wire.

In the Western Union Telegraph Company's plant there are at present approximately 530,600 miles of hard drawn copper wire. The amount is increasing rapidly as new circuits are being constructed and old iron ones replaced. The history of the development of hard drawn copper wire, whereby it was made applicable to telegraph and telephone use, is the subject of an interesting article in the *New England Telephone Topics*, for December, by Mr. Thomas B. Doolittle, who was a pioneer in the field.

EARLY EXPERIMENTS WITH COPPER.

Previous to 1877, much thought and large sums of money had been expended to get the benefit of the superior conductivity of copper for electric line circuits. Prof. Morse had used copper wire in the construction of his experimental line between Baltimore and Washington and the Western Union Telegraph Company had tried it out in New Jersey. These attempts had failed for the reason that the wire used was ordinary market wire, which was not strong enough to sustain its own weight. Other experiments made at about that time consisted in doubling the wire and twisting it; also in using a steel wire with a copper ribbon wound spirally about it. In another case, the copper ribbon was folded longitudinally about the steel wire; in another, copper was electroplated on the steel wire. As these and many other attempts along the same line proved equally futile, it remained for Mr. Doolittle to avail himself of the fact that the process of drawing wire hardens its surface, and to obtain hard drawn copper wire as an adaptation of this property.

The wire for connecting the several mills, offices, and residences of the officials of a brass company was drawn in its own mills under the direct supervision of Mr. Doolittle. The problem was to draw a rod of a given size down to a wire of a given size and it was only after many repeated trials, in which different sized rods were used and in which the finished product was either too brittle or too soft, that the desired result was accomplished.

This was in 1877, but it was several years before any other commercial use was made of the wire. The fact that it was in successful use seemed to be no argument for it and the objections to hard drawn copper wire, without any investigation whatsoever, were many. It was too costly; it would stretch and sag and would not stand exposure to the elements; the structure of the metal was impaired by the drawing process and the conductivity was reduced to a point where it would be little, if any, better than iron; it was even argued that the wire would expand from the heat of the sun and not contract to normal when cool.

FIRST LONG COPPER CIRCUIT.

It was not until 1883, six years after hard drawn copper wire had been in constant and successful service, that Mr. Theo. N. Vail, then general manager of the American Bell Telephone Company, commissioned Mr. Doolittle to build a metallic circuit of No. 8 B. W. G. hard drawn copper wire between Boston and New York. The cost of the experiment was estimated at about $70,000, which, in those days of the telephone development, was considered a very large sum of money. At that time all the wires were overhead; consequently the copper circuit had to be strung through the network of every intervening city on poles and over housetops. After the lines were at last completed and after many delays due to interruptions from stringing wires in intervening cities, from blasting of rock near the line and even from the hauling out of cable in the Harlem river by a tug boat, the tests were made and the circuit approved by the directors of the company.

During the tests and experiments, Messrs. Preece, of England; Wahner, of Germany, and Berton, of France, each at the head of the telegraph and telephone departments of their respective countries, visited the experimenter in his little laboratory, and each returned home to institute the manufacture and use of hard drawn copper wire.

On August 15, 1885, the American Telephone & Telegraph Company was organized with Mr. Theo. N. Vail as President, and from that time, the general adoption of hard drawn copper wire for toll lines, and very largely for exchange lines, was rapid.

IMPROVEMENTS IN MANUFACTURE.

Great improvements in the process of manufacture have been made in recent years. In the old process, billets of copper were rolled into sheets and then slitted into square rods. These rods were tapered by means of a hammer, so that they might be inserted far enough through the drawing die to be grappled on the opposite side, after which they were ready to be drawn into wire. The method of starting with a square rod had disadvantages for the reason that the corners were likely to lap and fold over in the process of drawing, thereby producing flaws or bad places in the wire. In the new process, the copper is received from the smelting works in round bars, about 54 inches long and three-fourths of an inch in diameter. These bars are heated and run through a series of grooved rolls until reduced to a diameter of five-sixteenths inches. After treatment with sulphuric acid to remove whatever oxide has been formed during the rolling operation, the rods are immersed in a lubricant of tallow and soap, and are then ready for the drawing process.

The cost of production has been enormously reduced by the new process. Whereas, under the old process, a very skilled workman was required for each single drawing, an attendant is now able to care for several continuous drawing machines that are run at a speed unapproachable by the old method.

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Early History of the American District Messenger Service.

BY HENRY W. POPE.

The early days of the district telegraph were not unlike those of the telephone. Why one needed a call box in his house, and why one should pay thirty dollars per annum were just as difficult to set forth enticingly to the public as was the so-called "toy," the magneto telephone, which has grown into a corporation with interests second only to those of the United States Steel Corporation but with ramifications far beyond it.

In the early seventies, Mr. E. A. Calahan had been interested in the inventing and promoting of the three-wire stock printer and had also perfected and put in operation a private line printer which was utilized between banks and the Clearing House, switching through a central exchange. This, as the writer recalls it, preceded the Law dial and telephone system, the dial telegraph operating similarly through a central office, both schemes being followed later, in a measure, by the telephone.

Mr. Calahan conceived the idea that there was a domestic field for electricity and devised an instrument consisting of a Seth Thomas clock movement supported upon a circular iron base and covered with a glass shade. The base projected downwards at one side which provided a means for fastening the instrument to the wall. Two break wheels were attached to the clockwork, either of which could be brought in circuit by means of a switch. One wheel was notched for the even number and the other for the odd; the former indicating "messenger" and the latter "fire."

The apparatus had to be wound up by hand and the release of the clock movement, by pulling a hook downward, caused the break wheels to revolve and transmit the signal to the central office. Later this was developed into an automatic and non-interfering call box.

The first district office was established in Brooklyn and was managed by Mr. L. H. Smith, an experienced printing-telegraph operator. Two more districts were afterwards opened in South Brooklyn, and one in the vicinity of Clinton Ave., it being believed at that time that the greatest possible development would be along residential lines. The Brooklyn territory was later sold to the Brooklyn District Telegraph Company and Mr. F. P. Sherwood became superintendent, Mr. Smith having resigned to embark in the retail drug business. Mr. W. H. Sawyer, a well known telegraph operator, became identified with the enterprise as consulting engineer.

Following the Brooklyn development a company was formed in New York and Mr. E. W. Anderson was made president. This was followed later by the appointment of Mr. W. H. Sawyer as general superintendent; Mr. Geo. F. Durant, superintendent and Mr. Henry W. Pope, assistant superintendent in charge of construction. Ample capital was secured and the plant rapidly extended, covering Manhattan Island. Mr. Sawyer proved to be the right man in the right place, a competent electrical engineer, strict disciplinarian, methodical in the extreme and a man who would, as Josh Billings used to say, "chase cockroaches up and down stairs till they wore their legs off to their stomach." One could never tell when Mr. Sawyer would drop in and go through one's desk and criticise vigorously the condition of its contents; yet to this day the writer appreciates what at that time seemed an unnecessary procedure. The systematic development of the plant, the central office system and all the details were unquestionably the product of Mr. Sawyer's brain and became the model for all outlying district companies afterward formed.

The first districts opened in New York almost at the same time were one at Broadway (about No. 907) between Twenty-second and Twenty-third Streets, the other at Broad Street, corner of Exchange Place. The office at 907 Broadway was the first to open for business and as the whole scheme was a good deal of a speculation, intense interest was manifested in the operating development. Frequently a day would pass without having had more than one or two calls and the registers were watched for them by officials as a cat watches a rat hole. However, the calls increased with encouraging rapidity and new uses developed and provision was made for them. This success justified the opening of other districts in rapid succession and applications were made for house protection, for police-patrol, fire service, circular delivery, etc. These services were given consideration and became established features.

In July, 1874, Mr. Sawyer resigned and took up the establishment of district companies in other cities, Mr. Durant succeeding him, and the writer was moved up to the superintendency.

During these early years of the business the official duties were extremely arduous, necessitating constant vigilance, night and day, because of the police, fire and burglar alarm and messenger features requiring much prowling around at all times of night to keep the large force of messengers and patrolmen up to proper standards of duty. The company had its own printing department and many of the original general orders were set in type by Mr. Geo. F. Durant, who later became the head of the Bell Telephone Company of Missouri, at St. Louis.

Upon the writer's assuming the management, the messenger and police departments were organized on a military basis which involved an annual parade, generally in connection with the National Guard, and the presentation of gold and silver medals awarded for meritorious or heroic conduct. These parades, in some instances, exceeded seven full companies, twenty-two files, front, from curb to curb, and the marching was not excelled by any of the regiments of the National Guard. The messengers were officered by the company officials, from the general superintendent down. A school of instruction was also instituted for messengers in which they were taught cleanliness, politeness, and the de-

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tails of the business. As many as 100 boys were kept in this school for thirty days at a reduced wage and were available as an auxiliary force for emergency purposes. The messenger force was increased and decreased in harmony with the demands of the business and the gross earnings of the messengers.

To those familiar with the "ins and outs" of this business, it has always seemed that a high class service might be made just as efficient today as formerly, regardless of telephone development, which is considered to have worked detrimentally to the interests of the district business. In its day the service was efficient and reliable and had the good will of the public. The company's messengers in 1875 delivered two-thirds of all the stock handled in Wall Street. As many as eighty boys in this district were sent out in one hour, or one to every three-quarters of a minute. The messenger business was always a profitable one and it is believed that it could be made just as profitable today. It also paid dividends on a capitalization of $2,000,000, besides providing a comfortable surplus.

The average earnings of $1.50 per day per messenger imbued the writer with the idea that by doing away with the box rentals, amounting to some $100,000 annually, the number of boxes could be largely increased, likewise the uses for messengers. The American District Telegraph Company never could bring itself to this idea and hence left the field open for the organization of the Mutual District Company, which carried out the policy of free call boxes, established a great system and practically dominated the field until finally purchased at a goodly profit to all those interested. The district service was of great usefulness in developing boys to become important factors in the business world. It furnished a large portion of the first ticket agents of the elevated railroad, through the good offices of the late Col. F. K. Hain, general manager, who learned to realize the advantages of good discipline and the reliability of the young men sent to him by the district company officials. Many former messengers became leading members of the Stock Exchange, and of Stock Exchange houses; many are officially connected with the telephone company; one of the author's office boys is an auditor of a leading express company, and others hold official positions in the telephone companies. A few graduates from the ranks of the American District service in other capacities during my administration are well known, and some of them internationally, and the writer points with pride to what little credit is due him for starting these people on their successful careers: Mr. Thomas D. Lockwood, general patent counsel of the American Telephone and Telegraph Company, Boston; Mr. John H. Cahill, vice-president New York Telephone Company; Mr. John McAllister, wire chief and Mr. W. E. Huntington of the New York Telephone Company, and others.

Mr. Geo. F. Durant, who was, at the time of his death recently, vice-president and general manager of the Bell Telephone Company of Missouri and was as previously mentioned, an enthusiastic district telegraph man and organized and operated the district service at St. Louis, which afterwards took up the telephone interests in that city.

Of those referred to in this article Mr. E. A. Calahan, the well known inventor of telegraph instruments, is now living in Brooklyn. Mr. W. H. Sawyer made a fortune in the electrical wire business in Providence, R. I., and has retired from active work. He lives in Pasadena, Cal., during the winter season and in Providence in the summer.

It is well to record the prominent part the early district organizations played in the development of what has now become the greatest industry, excepting possibly the Steel Corporation, but with interests more widespread and appealing almost individually to every self-supporting person in the United States.

The district companies quite generally throughout the country took up and developed the telephone and their officials afterward became important factors in the telephone field, notably Mr. W. D. Sargent, at Philadelphia; Mr. T. B. A. David, at Pittsburg; Mr. John I. Sabin at San Francisco; Mr. C. H. Wilson at Chicago and Mr. Chas. H. Sewall at Albany. Mr. Sewall, it should be noted, promoted one of the first telephone exchanges, early in 1878, and was the first to introduce message rate charges.

DO NOT THROW AWAY GOOD MONEY on a second-hand typewriter. Secure a "Central" factory-rebuilt, the best investment in the long run. Old "mills" taken in exchange. Postal employes may **purchase** at 75 cents weekly. Write me personally. **CENTRAL TYPEWRITER EXCHANGE**, New York. D. A. Mahoney, Representative.

Obituary.

Harry C. Webber, aged 23, an operator for the Postal Telegraph-Cable Company at Champaign, Ill., died at his home in Urbana, Ill., on January 27.

Charles E. Wise, formerly operator at Newark, Ohio, died at Chicago, January 28, aged 57 years.

C. F. Wilhelm for many years an operator on the Lake Shore and Michigan Southern Railway at Erie, Pa., and well known in commercial offices, died in that place January 21.

Alva McCall, aged 33 years, employed in the Pittsburg Western Union office for a number of years, died February 3. His remains were taken to his old home at Coshocton, Ohio, for burial.

John Benjamin Page, formerly manager of the Western Union office at the Metropolitan Hotel, New York, and of other city offices, died at Montreal, January 23, of paralysis. He was 71 years of age. Mr. Page was well known to the old time telegraphers in New York.

NEW YORK, POSTAL.

A class for instruction in telegraph engineering has been inaugurated by the employes of this Company. The first meeting was held February 2 with forty members present. Mr. Donald McNicol, of

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the electrical engineer's office is the instructor. A course of instruction has been prepared to cover the following subjects: Sources of Electricity Used in Telegraph Work; Points in Telegraph Circuits Where Currents are Applied; Instruments Used in Telegraphy; Repeaters; Switchboards; Testing; Effects of Capacity and Inductance; The Phantoplex; The Telephone; Printing Telegraphs. The meetings will be held weekly in the electrical engineer's office where the equipment of that department will be available for the benefit of the class. Mr. F. E. McKieman is president of the class, and Mr. Henry L. Stern is secretary.

NEW YORK, WESTERN UNION.

Mr. Anthony J. Neyer of the Philadelphia force was a recent New York visitor, calling on many of his friends while in the city.

Meeting of Mutual Investment Association.

The second annual meeting of the Mutual Investment Association, consisting of the employes of the Postal Telegraph-Cable Company, was held at 253 Broadway, New York, on the evening of February 1. The treasurer, Mr. E. Reynolds, was pleasantly surprised by the presentation to him of a handsome gold watch from the members of the association in recognition of his services. The presentation was made by city superintendent C. F. Leonard in a few well chosen remarks. In accepting the gift, Mr. Reynolds expresed his appreciation for the good-will thus shown and was greatly encouraged by this evidence of interest in his work.

The financial statement for the year showed excellent returns on the money invested, but the feature of the association's work most gratifying to its members is the assistance it has rendered to all employes in the service in time of financial need. In addition to advancing money to employes in times of sickness and distress at the legal rate of interest, 6% per annum, and permitting them to pay the sums borrowed in small weekly payments, it has made arrangements with a number of stores so that the needs of the family can be met without recourse to installment houses at installment prices and large bonuses.

The following officers were elected for the year 1911: Finance Committee: E. S. Butterfield, E. B. Pillsbury, C. Shirley, F. E. McKiernan; Treasurer, Edward Reynolds; Secretary, H. F. Hawkins.

Postal Company's Complaint Against Western Union.—The Public Service Commission at Albany, N. Y., on February 6 heard a complaint filed by the Postal Telegraph-Cable Company against the Western Union Telegraph Company, involving the transferring of messages from one company to the other for a destination not covered by the lines of the company offering the messages for transfer. The Postal Company states that for messages thus transferred it is obliged to pay the Western Union full rates and a further charge is exacted for additional words which indicate the transfer point and the date. By this arrangement the Postal Company loses about ten cents on each message transferred. The Postal's complaint declares that this arrangement is unreasonably and discriminatory, and the commission has been asked to direct its discontinuance. The commission reserved decision. The Postal Company was represented by Mr. W. W. Cook, general counsel; Mr. C. C. Adams, second vice-president and Isaac Smith, superintendent of tariffs. The Western Union Company was represented by Mr. Rush Taggart, general counsel, Mr. William Holmes, superintendent of tariffs, and Edward M. Mulford, division commercial superintendent, New York.

Announcing Order of Dancing on Fire Alarm Box.—At the recent ball of the Quincy, Mass., Police Relief Association the dances were announced on a fire-alarm box installed on the stage for the purpose.

WANTED.—Live agents in all large Western Union and Postal offices. Central Typewriter Exchange, New York.

A certificate of membership in the Telegraphers' Mutual Benefit Association, 195 Broadway, New York, affording protection for the family and dependents in the amount of $500 or $1,000, which is at once available and cannot be diverted from its mission, should be held by every eligible person between the ages of 18 and 45 engaged in telegraph and telephone service, either commercial or railroad. If those not now members could realize and fully understand the stern necessity for beneficial help too often experienced by bereft families, would they not make earnest effort to secure such provision? Write for particulars.

MARTIN'S LATEST VIBROPLEX, $9.00. Address James B. Havice, General Agent, 253 Broadway, New York.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

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.

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Telegraph and Telephone Age

No. 5. NEW YORK, MARCH 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.—XIII.

A Study of Telegraph Apparatus.

BY WILLIS H. JONES.

HOUSE WIRING.

To those uninformed, the laying of house wires under the floors and in other parts of the building occupied by a large telegraph office is considered merely a matter of stringing the conductors from point to point as desired without regard to any particular rule.

Such, however, is not the case. Everything depends upon the purpose for which the conductors are to be used, as well as upon the method employed in supplying the instruments with current.

Furthermore, one class of floor conductors may be of comparatively small gauge, while others must consist of either one very large wire, or a number of small bare conductors twisted together in rope fashion so as to form the conductivity equivalent of a large gauge solid conductor. Finally, some of these floor conductors must have one of their terminals left "open" permanently. Another set must have both terminals open, while a third class is normally closed at all times. It should thus be apparent that the student may learn many interesting facts in connection with this part of electrical engineering if he will study closely the accompanying diagrams, Figs. 1 and 2, which illustrate the several principles involved in this class of work.

The most important point to realize and appreciate is that the conductors nearest the generator, that is to say, the "leads" must carry the entire current that is to be distributed to the various instruments, while those more distant carry only such a volume as is required for those instruments which are in circuit beyond. For this reason the mains or generator leads must be large in diameter, not only in order to provide sufficient capacity for carrying large volumes of current, but to prevent a drop in the electrical pressure in them. The principle is the same as that involved in distributing water

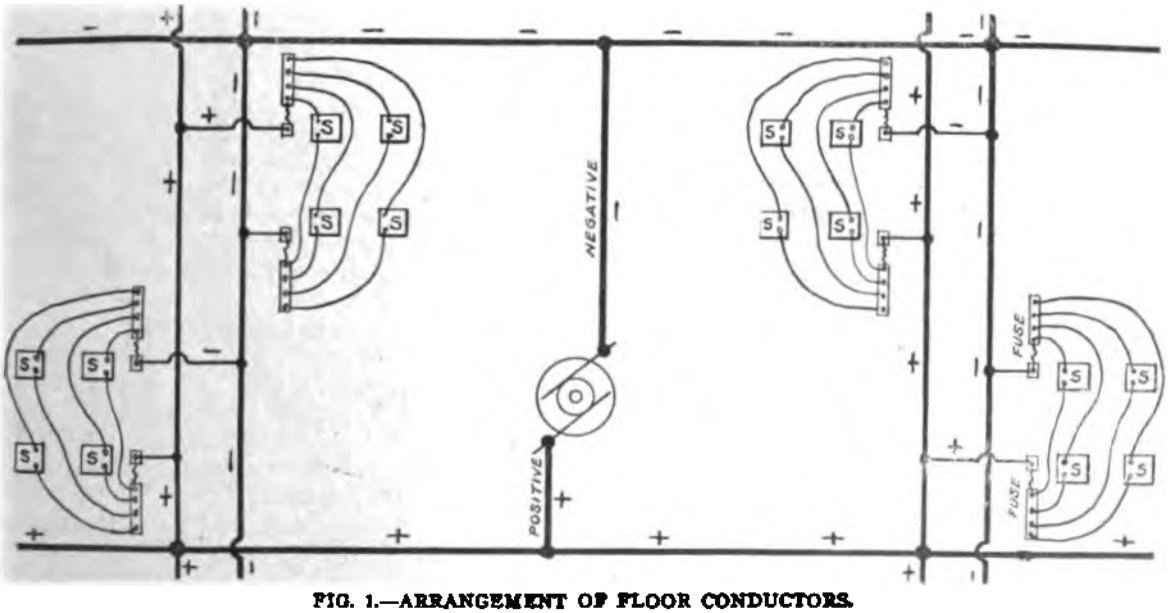

FIG. 1.—ARRANGEMENT OF FLOOR CONDUCTORS.

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throughout city mains. The main pipes near the reservoir must be large enough to carry all the water flowing therefrom, those between the street and the private house have a smaller diameter; yet even these must be larger than the pipes leading to the faucets, as they must be able to carry all the water the faucets might demand in case they should all be turned on at the same time.

The proper gauge required for leads in house-wiring is determined in the same manner as the diameter of a water main would be ascertained, viz.: find the total demand and then add to this volume a value sufficient to take care of future growth. In the water system the answer would be in terms of gallons. In electrical work the total present and future amperage is the point to determine. The rest is easy. Most electrical text books contain tables showing the safe current-carrying capacity of the different gauges of wires. From this table the proper size of conductor for any circuit may be readily determined.

Fig. 1 shows the manner in which the wires for a multiple system would be arranged. As a rule, the generator is located in the cellar where the earth foundation minimizes the vibrations due to the operation of the machines, while the operating department is usually several stories above. In order to prevent an excessive drop in the e.m.f. of the generator by the time the current reaches the upper floors and the different points in the operating department where the taps or connections are made with the desk instruments the resistance of the leads must be practically negligible. Hence the two wires shown, leading from the two brushes of the machine are large, usually consisting of several smaller wires made into a rope. The two wires to which they are connected (see diagram) are merely extensions of the generator leads and must also be large enough to offer no appreciable resistance. These extensions are then laid in trenches along the aisles in parallel, one being positive and the other negative. The main leads are then tapped with the instruments connected between them like rungs in a ladder as shown. As a rule only four or five instruments are grouped together in one such branch. Hence these tap extensions may consist of much smaller wires, because they are not called upon to carry a very great volume of current.

Theoretically, these parallel taps are not absolutely necessary as the instruments could be connected directly between the two large parallel mains. Practically, however, this method would not be satisfactory, for the reason that in case of a "short circuit" of low resistance between the mains,

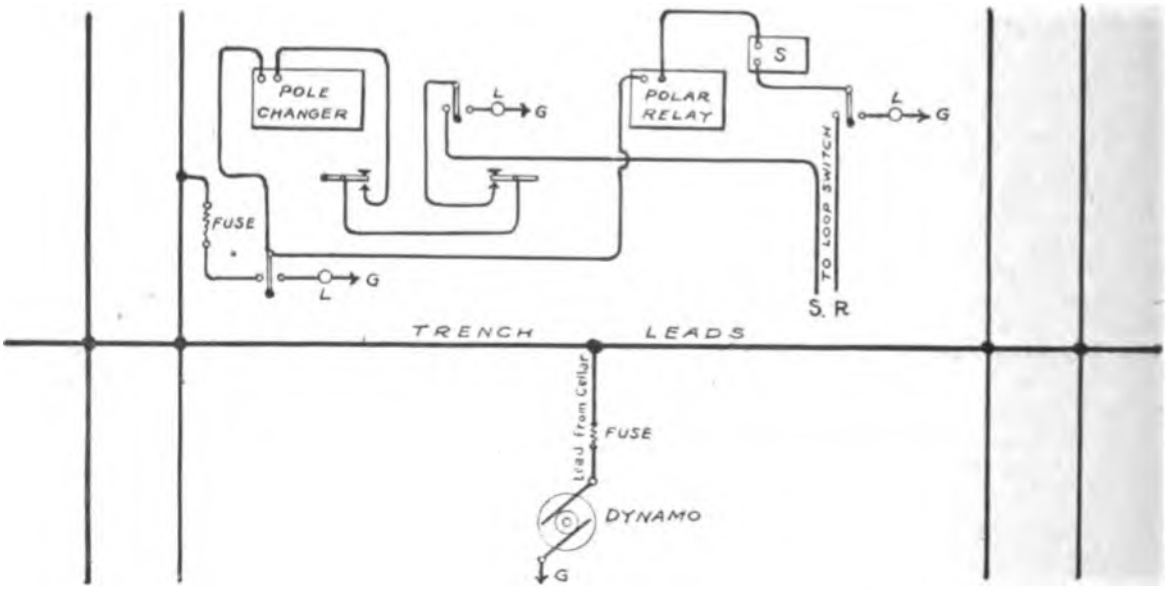

FIG. 2.—FLOOR WIRING FOR GROUNDED LOCAL CIRCUITS.

the fuse would blow out and it would be like hunting for a needle in a haystack to find the fault, as every circuit in the system would be open. By grouping the apparatus in bunches of five, a blow-out due to a short circuit in one instrument would simply open the five circuits of that particular group and the fault could thus be readily located.

Fig. 2 illustrates the manner in which the floor is wired for grounded local circuits. The same rule as to the size of wires for leads and taps holds good with this as with the system just described. In the grounded circuit system, however, only one end of the lead is left open, but it may be tapped and extended to all parts of the room in the manner shown in the diagram. This latter system is the one used for duplex local circuits, and pony wires. In fact, it is the method employed for main wires and all grounded circuits of every description.

(To be Continued.)

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Recent Telegraph and Telephone Patents.

ISSUED FEBRUARY 7.

983,491. Sanitary Appliance for Telephones. To G. T. Hadley, San Francisco, Cal.

983,570. Holder for Telephone Receivers and the Like. To S. K. Rothschild, Detroit, Mich.

ISSUED FEBRUARY 14.

983,905. Telegraph Sounder. To H. T. Johnson, New York.

983,966. Telephone Testing System. To C. S. Winston, Chicago.

984,108. Apparatus for Determining the Direction of Space-Telegraph Signals. To O. C. Roos, Cambridge, Mass.

984,202 and 984,203. Selective Signaling System. To J. Erickson, Chicago.

984,204. Lockout for Party Line Telephone Subscribers' Stations. To J. Erickson, Chicago.

984,235. Telephone System. To A. Nemeth, New York.

The following patents have expired:

510,929. System of Telegraphy. Issued to Josiah A. Parker, St. Louis, Mo., and Leland L. Summers, Chicago, Ill.

511,005. Telegraphic Relay. Issued to Edward Weston, Newark, N. J.

511,081. Telautograph. Issued to Rudolph M. Hunter, Philadelphia, Pa.

511,118. Magneto Telephone. Issued to James A. Brown, Moline, Ill.

511,172. Telegraphic Transmitter. Issued to Mary E. Stinde, Red Bud, Ill.

511,244. Telegraphic Relay. Issued to Frank P. Medina, San Francisco, Cal.

511,276. Two-station Telephone Circuit. Issued to Frank Pickernell, Newark, N. J.

511,358. Telephone. Issued to Barton Pickering, Dayton, Ohio.

511,464. Multiple Switchboard System for Telephone Exchange. Issued to Charles E. Scribner, Chicago, Ill.

511,589. Telephone System. Issued to Frank R. Colvin, New York, N. Y.

511,739. Telephone System. Issued to John J. McNally, California, Mo.

511,787. Self-Closing Telegraph Key. Issued to Henry E. Moss, Kansas City, Mo.

511,882. Telephone Transmitter. Issued to Stephen C. Drew, Boston, Mass.

512,214. Composite Telephonic and Multiple Telegraphic Transmission. Issued to Frank A. Pickernell, Newark, N. J.

512,398 and 512,399. Apparatus for Telephone Switchboards. Issued to Charles E. Scribner, Chicago, Ill.

512,422. Printing Telegraph. Issued to Emil A. Wirsching, New York, N. Y.

512,872. Sextuplex Telegraph. Issued to Thomas A. Edison, Menlo Park, N. J.

Personal.

Mr. William P. Sidley, vice-president and general counsel of the Western Electric Company, Chicago, has been elected to the presidency of the Young Men's Christian Association of that city.

Mr. Bion J. Arnold, the well known electrical engineer, Chicago, and an old-time telegrapher, has been honored by the University of Nebraska, which has conferred upon him the degree of Doctor of Engineering.

Mr. J. Frank Howell, a former telegrapher, and now a stock and bond broker, New York, has issued a 64-page pamphlet giving statistics and diagrams of the active stocks dealt in at New York covering the year ending December 31, 1910.

Mr. Maurice E. Fox, formerly of the engineering department of the New York Telephone Company has accepted a position as engineer in the Edison laboratories, Orange, N. J., in connection with the work on the new Edison storage battery.

Sir W. H. Preece, the well-known English electrician, and for many years at the head of the English telegraph service, London, has gone to South Africa, primarily for his health. He will be absent about three months. Sir William was born in 1834 and has been in active service for nearly sixty years.

U. S. Senator George S. Nixon of Nevada is the subject of an interesting and chatty story in a recent issue of a Washington, D. C., paper. Senator Nixon started his business career as a telegrapher. He afterward became interested in banking, mining, etc., and is now a "multi-millionaire." He distinguished himself a few years ago, while a passenger on a wrecked train, by climbing a pole and, after cutting in an emergency telegraph set found on the train, summoned relief.

Mr. E. F. Varona, manager of the Western Union Telegraph and International Ocean Cable Companies, at Havana, Cuba, is the subject of a complimentary article published in the February 1 issue of *The Lucha*, a newspaper of that city. The article commends Mr. Varona's active work in behalf of the public and the press in connection with the recent Key West-Havana aviation flight. Mr. Varona has for many years enjoyed the confidence of the people of Havana, officials and civilians alike. He is always on the alert in behalf of their interests, and leaves nothing undone to give them the best of service. In the Spanish régime Mr. Varona was as highly esteemed as he is now, under different political conditions.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager of the company, who has been absent on a trip of inspection in the western and Pacific Coast states is now in the southern section of the country en route to New York. He will be at his office again about March 10.

Mr. Charles P. Bruch, third vice-president and Mr. E. B. Pillsbury, general superintendent of the eastern division, New York, attended the banquet of the Sons of the Revolution on the evening of February 22 in honor of George Washington's birthday.

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Mr. C. C. Adams, second vice-president, is authority for the statement that this company does not approve of the day-letter plan, just instituted by the Western Union Telegraph Company, and will not adopt a like service.

Mr. N. I. Taylor has been appointed cashier of the Washington, D. C., office vice Mr. J. P. Malloy.

Mr. T. P. Wheeler, night chief operator at St. Louis, has resigned on account of failing health. Mr. Wheeler has been with the Postal Company since May 1, 1884.

Mr. Louis J. Mackey, manager of the Franklin, Pa., office of this company, has been appointed chief clerk to Mr. H. Scrivens, district superintendent at Pittsburg, Pa. Mr. Mackey entered the telegraph service as messenger in September, 1886, and was made manager of the Franklin office in 1890.

Mr. E. W. Miller, chief operator of the Philadelphia office was a recent New York visitor. He attended the Postal employes' electrical class on the night of February 16, and was deeply impressed with the educational work.

Mr. Jos. Coffer, manager of the Postal office at Galveston, has been transferred as manager to Oklahoma City, Okla. Mr. Fred A. Rollfing succeeds Mr. Coffer as manager at Galveston. Mr. R. E. Reese, manager at McAlester, Okla., has resigned to enter the coal business and is succeeded by Miss Myrtle Abbott. Mr. J. F. O'Donnell, manager at Joplin, Mo., has resigned. He is succeeded by Mr. J. E. Sandford, who was promoted from Guthrie. Mr. L. E. Waugh has been made manager of the Guthrie office.

Postal Telegraph Club of Atlanta.

The second annual meeting of the Postal Telegraph Club of Atlanta, Ga., was held February 17. Plans were considered for extending the usefulness of the organization. The report of President Daviet was very interesting and showed the club to be in an excellent condition financially. One of the features of the evening was the music on the piano and violin by Mr. C. H. Ashburn, Jr. and Mr. F. J. Poundstone. Both are members of the Club, and accomplished musicians. The annual banquet will be held in April, the date to be announced later.

The following officers were elected: president, Mr. W. C. Daviet; vice-president, Mr. A. D. Holcomb; secretary, Mr. L. A. Minor; assistant secretary; Mr. F. F. Pursley; treasurer, Mr. G. W. Oliver; Governing Committee, the officers and Messrs. D. C. DeLaney and C. G. Knapp.

Postponement of Morse Electric Club Dinner. On account of the unavoidable absence of Mr. Theo. N. Vail, president of the American Telephone & Telegraph Company and of the Western Union Telegraph Company, who was to have been the guest of honor at the annual dinner of the Morse Electric Club which was to have taken place at the Hotel Savoy, New York, February 23, the meeting has been postponed. The dinner will probably take place about the middle of March.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager of the company, who has been on an extended trip of inspection and is now in Texas, will return to his office by the end of the first week in March.

Mr. W. A. Sawyer, district commercial superintendent at Philadelphia, has been transferred to a similar position at New York. Mr. James F. Nathan, district commercial superintendent at New York, becomes superintendent of the Metropolitan District. The superintendency at New Haven, Conn., has been abolished and the offices comprising that district have been annexed to the Boston district, presided over by Mr. C. F. Ames, with the exception of the offices in Connecticut, which have been attached to the first district, presided over by Mr. Sawyer. Mr. J. W. Reed, district commercial superintendent at New Haven, has been transferred to a similar position at Philadelphia, vice Mr. W. A. Sawyer.

Mr. B. S. Jones, manager of the Spokane, Wash. office, has been promoted to be district commercial manager, second district, Pacific Division, with headquarters at Seattle, Wash.

Mr. H. K. Griffin, of the general operating department, New York, has been advanced to the position of chief operator of the Atlanta, Ga., office.

Mr. J. E. Rowe, until recently identified with the Postal Telegraph interests at Birmingham, Ala., and who a short time ago accepted a position with this company at Atlanta, Ga., has been appointed chief operator of the Jacksonville, Fla. office, vice Mr. C. C. Delany, resigned.

The battery plant of the Western Union Telegraph office at Dickinson, N. D., comprising 4,600 cells, has been displaced by eight electric generators which have just been installed. Mr. C. F. Norton is the manager of this office, which has recently been made an important repeater and relay station.

Mr. P. G. White, who was recently appointed manager of the Wilmington, N. C., office of this company, started his telegraphic career in that office as messenger and has held every position except lineman. He left the company in 1901 to go with a leased wire concern, and has worked since then at Asheville, N. C., Cincinnati, Ohio, Augusta, Ga., and Birmingham, Ala., going direct from Birmingham to Wilmington to accept his present position.

Mr. L. F. Saylor has been appointed to a position in the office of Mr. H. J. Kinnucan, district commercial superintendent, Detroit, Mich.

Mr. Louis Casper, superintendent of equipment, Dallas, Tex., was born in Manchester, England, in 1871. He was educated in St. Enoch's School, Glasgow, Scotland, and the Normal College and Cooper Institute, New York, and is a graduate in chemistry and natural philosophy. He began his business ca-

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reer in this country in 1885, entering the repair shop of the Western Union Company, in New York, and afterwards became an operator. He filled positions as Wheatstone chief, repeater chief, wire chief, instrument inspector, and cable inspector. Later, he was contracting engineer for the Sandwich Electric Company, Sandwich, Ill., and afterwards principal in telegraph engineering and wireless telegraphy in the John W. Gates College, at Port Arthur, Tex. Mr. Casper is an inventor of considerable note, having taken out over fifteen patents, mostly electrical, and was awarded a gold medal for an electrical signal.

Mr. George Sinclair Tulloch, district plant superintendent at San Francisco, Cal., was born in San Francisco, April 18, 1873. In 1886 he entered the service of the American District Telegraph Company, of San Francisco, as messenger, and in 1887 he accepted the position as messenger of the Pacific Bell Telephone Company. In the year following he became an operator. Since that time he has advanced through the positions of lineman, patrolman, foreman, clerk to general superintendent, and has held various other positions with the Bell telephone interests on the Pacific Coast. When he severed his long connection with the telephone company, he held the position of district superintendent of plant, Coast District, with headquarters in San Francisco. On November 15, 1910, he accepted the position of district plant superintendent with the Western Union Telegraph Company.

Opening of New Office of Western Union Company at Seattle.

The new operating department of the Western Union Telegraph Company at Seattle was formally opened to the public on January 17 with a reception. The reception committee included Mr. E. Boening, district commercial superintendent, Mr. W. J. Smith, district commercial agent, Mr. G. D. Hood, district traffic superintendent, Mr. E. L. Ritter, district plant superintendent, Mr. J. F. Rawie, manager, and Mr. J. L. McDonnell, chief operator. Prominent citizens attended the function, and during the afternoon the company officials received a body of students from the electrical engineering class of the University of Washington.

The telephone department in connection with the delivery and receipt of telegrams has been considerably enlarged, and seven experienced telephone operators are employed. The new operating department occupies approximately 5,000 square feet, and the quarters used by the general offices comprise about 7,500 square feet. Comfortable rest rooms for male and female employes, have also been fitted up. It is estimated that fully 2,000 people attended the reception.

Pensions for Western Union Telegraph Employes.

Mr. Thos. F. Clark, vice-president of the Western Union Telegraph Company has sent a circular letter to general superintendents, dated January 23, regarding a proposed plan of pensioning employes of the company. The letter reads as follows:

"To General Superintendents:

"The Western Union Telegraph Company is considering the matter of devising a plan for the pensioning of its employes for length of service or disability.

"Information is therefore desired concerning the nature and length of service, the age and the amount of monthly pay of all persons who are regularly employed on the lines and in the independent offices of the company, in accordance with the enclosed card.

"A card is to be filled in by each employe who has been in the service of the company continuously for not less than ten years; and the cards are to be forwarded through your office to the undersigned.

"I suggest that you send a copy of this letter to each superintendent for distribution to his office managers, with such additional instructions as may be necessary to insure the speedy return of the cards."

(Signed) THOS. F. CLARK,
Vice-President.

Western Union New Day-Letter Service.

On March 1 the Western Union Telegraph Company instituted a new day-letter service. The rate is one and a half times the night letter rate for a message of fifty words or less, written in plain language, to be sent at the company's convenience. In other words, where a ten-word day message now costs fifty cents, a message of fifty words or less can be sent for seventy-five cents.

The Anglo-American-Western Union Agreement.—A despatch from London states that at the annual meeting of the Anglo-American Telegraph Company on February 3, Mr. F. A. Bevan, who presided, admitted that there were difficulties in the way of concluding a provisional agreement with the Western Union Telegraph Company. He said that the directors, however, hoped to soon surmount these obstacles. As to the companies remaining distinct, he was not so sure that this would be the case, but he gave assurance that no agreement would be carried out without the consent of the shareholders of the Anglo-Amercian.

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, namely:

$E = 1.01830$ international volts at 20° C.

This is equivalent to an increase of about 0.08 of one per cent in the value of the international volt. The change will affect to a slight extent all measurements of electric current, electromotive force and power, and will in some cases require slight changes in electrical measuring instruments.

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The Telephone.

Central District Printing and Telegraph Company.—The annual meeting of the Central District Printing and Telegraph Company was held in Pittsburg, February 9, and the retiring directors were re-elected.

"Phonegram."—A correspondent suggests that the word "Phonegram" might be used to designate a telephone message. There is nothing fantastic about this word and it seems to fit the requirement very well.

Telephone Service in Charleston.—The Southern Bell Telephone Company has completed the work of cabling its open wire system in Charleston, S. C. The company has also just completed an extension to its building in Charleston. Mr. W. H. Rousseau is district commercial manager of the company.

Telephone Wire Through St. Gothard Tunnel.—The Swiss Government has authorized the establishment of a telephone wire through the St. Gothard tunnel, enabling Berlin and Frankfort to communicate with Milan and Rome. But, though it passes through Switzerland, it must not be used by the Swiss. The St. Gothard tunnel is 9¼ miles long.

Telephone Peak Loads in a Small Town.—Every death and every birth in a small town causes approximately 300 extra telephone calls, according to figures issued by a telephone company in Columbia, Mo. The calls resulting from the births are more trouble, says the report, because these are limited to women and the conversation occupies more time than in telling of a death.

Pacific Telephone & Telegraph Company Statement.—The Pacific Telephone & Telegraph Company reports gross revenues for the year ended December 31, 1910, of $14,667,111, an increase of $1,782,094, and a surplus, after deducting dividends, of $119,205, a decrease of $44,323. The total number of stations operated by the company, including private lines, on December 31 last, was 446,622.

Joint Meeting by Telephone.—Through the courtesy of the American Telephone and Telegraph Company the Ad clubs of Buffalo and Rochester, N. Y., on February 25 held a joint meeting by telephone, the actual meetings being held simultaneously in their respective cities. Each member of the two clubs was provided with a telephone so he could hear all that was said at the meeting at the other end of the line.

New York Telephone Company to Absorb an Up-State Company.—The New York Public Service Commission, Second District, has received a joint petition from the New York Telephone Company and the Clifton Park Telephone Company for approval of the transfer of the plant of the Clifton Park Company to the New York Telephone Company. The Clifton Park Company operates in Jonesville, Saratoga County, and the territory immediately adjacent thereto.

Telephony in San Domingo.—The Dominican Republic has no general telephone system. The Government operates long distance lines between the cities and towns, but the messages have to go through the operators, as conversations are not permitted except through State officials. Concessions have just been granted to build and operate telephone systems in Puerto Plata, Santiago de los Caballeros and San Francisco de Macoris. The maximum charge for service is to be $3 a month.

Telephone Expansion in Milwaukee. — Mr. Alonzo Burt, president of the Wisconsin Telephone Company, Milwaukee, Wis., in an address before the Merchants' and Manufacturers' Association of Milwaukee, February 16, predicted that that city would have a population of 600,000 inhabitants in 1930. His prediction was based upon investigations made by his company to ascertain how greatly its plant must be increased in order to provide for the service in twenty years. The company, he stated, expects to invest several million dollars as a result of this investigation.

Telephone Merger Contract Canceled.

In the case of the Sunset and Pacific Telephone and Telegraph companies against the City of Tacoma, Wash., federal Judge Donworth has entered a decree in which he directs that the contract transferring the franchises of the Sunset Company to the Pacific Company, drawn at the time of the so-called Bell merger, but without consent of the city, shall be canceled. He also enjoins the city or any employe of the city from attempting to forfeit the Sunset Company's franchises until their expiration in 1915.

Telephone and Telegraph Taxation in Michigan.—Judge Denison, of the United States District Court at Grand Rapids, Mich., has rendered a decision upholding the constitutionality of a new law which provides for the taxation of telephone and telegraph companies on an ad valorem basis and a temporary restraining order preventing the auditor-general from collecting taxes under this law has been dissolved. Hereafter these companies will pay taxes on the same basis that railroad companies do and the amounts, it is said, will be much larger than they have been.

Peking Telephone System.—The Imperial Chinese Telephone Administration expects to have a new system installed and operating by May, 1911.

Two telephone exchange buildings have been erected. Three thousand telephones are being installed, but the plant will admit of an increase up to 12,000, as the switchboards, at each of the two exchanges, have been designed each with a capacity of 6,000 telephones.

The telephone wires have been laid under ground. The cables are of lead tubing 3½ inches in diameter, and contain 400 wires. The cables are laid in earthenware pipes.

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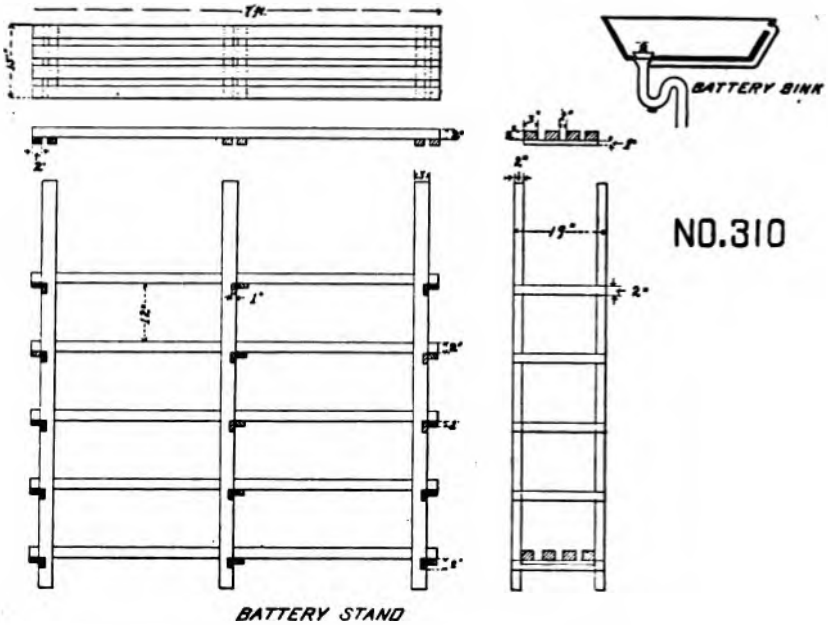
Standard Battery Rack of Postal Telegraph-Cable Company.

BY JOHN F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

In the standardizing of its equipment the Postal Telegraph-Cable Company has paid as close attention to small things as it has to the large ones.

The standard battery racks of the company are built up in the following manner: The uprights are two inches by three inches and the shelves are constructed of four two-inch by three-inch strips with a space of one inch between them. The end supports for the shelves are of one inch by two inch material, and the cross braces one inch by two inches. The space between the shelves is twelve inches in the clear, and that between the lower shelf and the floor is not less than six inches in the clear.



DIAGRAMS SHOWING CONSTRUCTION OF BATTERY RACK.

The wood used in the construction of these racks is North Carolina pine, dressed smooth, and oiled or well painted to prevent spilled solution from adhering to the wood. The uprights are usually carried to the ceiling so that the rack may be rigidly braced, and the cross braces and end supports are secured to the uprights by finishing nails, the heads of which are driven in and puttied over. From this form of construction it will be understood that these racks are very strong.

Battery sinks have an overflow outlet at the side and a plug at the waste outlet. This permits the dumping of cells to be cleaned without clogging the drain pipe with the refuse from the jars.

Fire-Killed Pine and Spruce for Poles.

A considerable market for the native fire-killed spruce and pine of Colorado may be opened as the result of timber-testing experiments conducted at Boulder, Col., by the local branch of the United States Forestry Service. The results indicate that for timber of the same size at the top, lodgepole pine and Engelmann spruce are practically equal in strength to the Western red cedar.

The investigations were made in the timber-testing laboratory of the University of Colorado, on poles nominally seven inches in top diameter and twenty-five feet long. Twenty poles of each species were used. The experiments showed that when the three kinds of poles were of the same diameter at the base, the cedar was considerably stronger, the pine being only 80 per cent. and the spruce 64 per cent. as resistant as the cedar. In elasticity the pine was 98 per cent. and the spruce 79 per cent. as strong as the cedar. When poles which had the same top diameter were used, the spruce and pine showed considerably more strength because of the greater degree of tapering which characterizes this kind of timber.

Although the tests showed that cedar is superior to either pine or spruce as a pole or a pole material, the native timber is by no means outclassed and should be found very satisfactory, the forestry officials say. If the lodgepole pine be treated with a preservative, it will outlast the untreated cedar in actual wear by at least five years. The life of a fire-killed lodgepole pine is twenty-five years. Untreated the pole would last only five years on an average.

Alleged Unreasonable Telegraph Rates in New York State.—The New York Public Service Commission, Second District, has received complaints from the Boards of Trade of the villages of Lake Placid, Saranac Lake, and Tupper Lake directed against the Western Union Telegraph Company, the Great Northwestern Telegraph Company of Canada, the Postal Telegraph-Cable Company, and the Champlain Telegraph Company, as to alleged unreasonable rates charged from these places.

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Cables and Their Care.

In an article by Mr. O. B. Bohny, in the "Southwestern Telephone News," the author gives much practical information on the care of cables, referring particularly to telephone cables. Inasmuch as telephone and telegraph cables are practically alike in construction, however, what applies to one is equally applicable to the other. Some extracts from Mr. Bohny's article, therefore, will be of interest to telegraph as well as telephone engineers, foremen and others.

Cables, although presenting a great many advantages to the telephone man in economy of operation and maintenance when properly cared for, are capable of a great deal of expense and annoyance to both the telephone company and to the subscriber when neglected or installed in a poor manner.

The first or most serious damage that can come to a cable is the presence of a high potential current in a cable, which burns open and welds the conductors together for sometimes as far as 200 to 300 feet from the points of entrance, and oftentimes further depending upon the strength of the current and the kind of cable used. It is obvious then, that a case of trouble of this character is a difficult one to repair promptly and one that is often costly whenever it becomes necessary to replace cable and terminals. A cable after receiving one or two such burns, will nearly always be a source of trouble by reason of the insulation having been burnt off or charred in minute spots on the conductors in various places and any little disturbance such as a sudden movement of the cable will tend to develop a case of trouble. This accounts to a certain degree for the pairs that go bad during clear weather.

A high potential current may be introduced in diverse ways, but it is nearly always due to the following reasons: The careless handling of a pair of bare line wires over high tension circuits by a lineman; the placing of drops and lines in close proximity to high tension circuits where they are liable to damage in case of storm or accident; and by the connecting of long lines of open wire into an unprotected terminal of a cable, which invariably invites any discharge of lightning along these long lines into the cables. This is perhaps one of the most common troubles we have to contend with.

The latter phases of trouble can be overcome by the placing of boxes equipped with fuses and lightning arresters at the unprotected points. It seems to be the opinion of some wire chiefs and managers that once such a box is in position nothing more is necessary to the successful diverting to ground of any stray currents that may happen. But it is human to err and many are the boxes the writer has investigated that were placed with a view of intercepting stray currents and which had failed in their purpose by reason of being destitute of carbon or copper blocks or on which the ground wire had been broken off or had never been placed. There can be no doubt but that, if all who have to do with plant maintenance would care for this part of the cable by systematic inspections and instructions to those who perhaps do not fully realize the necessity of perfect protection at these points, we would soon notice a marked decrease in the number of pairs bad in a cable, of the kind that are termed "chronic" or "scattered trouble."

The next cause of interruptions to service and one that is frequently expensive and more frequent than that described, is the presence of moisture or water in a cable. To enumerate the various causes of such trouble would take up considerable space, but some of the most common belonging to aerial cable are given: the shooting of bullets into a cable; the crystallizing and breaking of the cable sheath which surrounds the core, or the small, round holes in the cable sheath generally found under marlin hangers; improperly wiped joints; improperly filled potheads; trouble caused by spur holes and a miscellaneous assortment of other causes which can either be traced to carelessness or design.

As is doubtless known, expansion and contraction of cable sheath has become a serious question in some parts of the country, and has been studied by many with a view of overcoming this particular failing in cables. As we are concerned only with the neglect of cables, it may be stated that these crystallized places and breaks will usually occur where a number of hangers are off or at poles where slack has been left and the cables form a dip or loop. Consequently it will be advisable to be on the lookout for defective hangers and large loops or dips which, where they become too pronounced and cannot be taken care of along a cable lead, should be cut out and a split sleeve put on.

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, shows revenue from all sources of $580,008, compared with $549,225 in 1909. The net revenue was $88,504 compared with $84,563 in 1909. The net revenue for 1910 equals 2.3 per cent. earned on the $3,844,700 capital stock, as compared with 2.2 per cent. in 1909. Total assets, according to the balance sheet, are $4,466,954, of which $4,145,968 represents plant, franchises and stocks of merged companies. There were 342,821 more telegrams delivered than in 1909, and 214,817 more were collected and in the distribution department 6,540,882 pieces were handled, an increase of 2,626,144 over the previous year.

Mr. F. W. Sprong, manager of the Postal Telegraph-Cable Company, Cincinnati, Ohio, in renewing his subscription for another year, says: "Your paper is up-to-date and I can assure you I receive much pleasure in reading its contents."

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Capt. L. T. Lindsey.

BY E. H. HOGSHEAD, MERIDIAN, MISS.

The first meeting of the writer with Capt. L. T. Lindsey, father of Judge Ben. B. Lindsey, was during the second year of the Civil War. What his initials stood for I never knew: he was known as "Tunny" Lindsey, and that is all that was generally known of his name. He was an operator at Jackson, Miss., during the siege of Vicksburg, and after the capitulation of that city and the evacuation, a little later, of Jackson by the Confederates, Lindsey joined the cavalry as an operator. He was soon after appointed adjutant with the rank of captain, on the staff of Brigadier-General Jas. R. Chalmers, whose command served under General Forrest. He continued in this position until the end of the war. He took part in many strenuous campaigns, as any one who followed General Forrest necessarily had to do, but he seems to have passed through the protracted struggle unscathed.

I am indebted to Colonel George M. Dugan, former superintendent of telegraph of the Illinois Central Railroad and now living in retirement at Tip Top, Ky., for some interesting incidents in Captain Lindsey's career. Colonel Dugan, who was at that time assistant superintendent of the Southwestern Telegraph Company, had equipped him with an old Clarke relay, encased in a box, which Captain Lindsey wrapped in his blanket and tied to his saddle behind him.

On one occasion General Chalmers, having been driven out of Oxford, Miss., by the enemy, retired to Water Valley, some twenty miles south, leaving Lindsey with a few scouts as a rear guard and corps of observation. Colonel Dugan, who was in the office at Water Valley, waited for tidings from Lindsey, as per agreement. Soon Lindsey's office "astraddle of a log," six miles south of Oxford, reported that a scout just in from the front informed him that the town of Oxford was on fire, which proved to be true. (This was the time when the residence of Hon. Jacob Thompson, Secretary of the Interior under President Buchanan, was burned, his wife not being permitted to save anything.) Soon another horseman, uniformed in blue, riding like Jehu, was espied in the distance and his approach was watched with suspicious interest. The rider proved to be a negro, a slave of Colonel Walton, a prominent citizen of Oxford. He unfolded a tale to the effect that a "Yankee" major had accosted him and asked him to hold his horse for a few minutes, while he dismounted and entered a house. The major being a little slow in reappearing, it occurred to the darkey that he might capture the horse for his own account. So he mounted and put spurs to the animal, which was a fine one and handsomely equipped, and left town, and running the gantlet of numerous pickets, and reached the "rebel" camp safely with his prize, which he soon disposed of to good advantage. After the enemy left he returned to his home in Oxford with the proceeds of his spoil in his pocket. This story, with elaborate details, was given by Lindsey, while astride the log, to Colonel Dugan at Water Valley.

On another occasion Colonel Dugan joined Lindsey and General Chalmers' command in a sally from Holly Springs, Miss., in search of the enemy. They soon found him in such force that they were unable to cope with him and they sounded the retreat, which necessitated much activity on the part of Colonel Dugan in making good his escape, his strenuous endeavors to reach a place of safety being handicapped by the loss of his horse, which had been shot from under him. But he escaped with as much grace as any man of the physical proportions of the Anakim could be expected to exhibit under such trying circumstances. (But I was strictly prohibited from making public this little episode. So I whisper it on the sly.)

Captain Lindsey was a man of medium height, slight build, weighing about 135 pounds, the complexion of a light brunette, piercing black eyes, raven-black hair; in bearing gentle and unobtrusive; in manners refined and engaging. As a telegrapher his ability was of high class. I have heard it said that he could copy fifteen to twenty words behind the sender with ease; while his penmanship left nothing to be desired. Where he learned the telegraphic art, or what particular locality is entitled to the credit of being his birthplace, is not now ascertainable. But it is known that he was a native of central Mississippi.

When peace returned, Lindsey entered the service of the Mobile & Ohio Railroad as an operator, at Jackson, Tenn., where at the same time he was manager for the Western Union Telegraph Company. He was married at Jackson, and remained there a number of years. While there he spent much time and labor in trying to perfect a printing telegraph. On one occasion he showed the writer a part of his apparatus, as far as completed and workable; but he finally failed to perfect it. As the late Mr. John Van Horne, vice-president of the Western Union Telegraph Company, remarked, anent his failures: "Tunny made the mistake of not fully informing himself as to how far others had gone before him in the same direction."

After a residence of several years in Jackson, Tenn., Captain Lindsey removed to Denver, Col., where he secured employment in some kind of railroad work; but I know nothing of his career there. However, I learn that he died there, in middle life, some ten or twelve years ago, leaving a wife, one daughter, and three sons, of whom Judge Ben. B. Lindsey is the eldest.

At this point I may say that a brother of Captain Lindsey was slain in New Orleans in front of the Custom House, in the ranks of the citizen soldiery, in the battle on September 14, 1874, between the metropolitan police, a political organization led by General Badger, in support of the

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pretensions of William Pitt Kellogg, to the Governorship of Louisiana, on one hand, and the forces of the legal governor, Penn, on the other, wherein Kellogg was overthrown, and the people vindicated their right to self-government.

But perhaps the greatest of Captain Lindsey's claims to distinction is the fact that he was the father of Judge Ben. B. Lindsey, of Denver, Col., the originator of the famous Juvenile Court, whose reputation as such, and as a political reformer and writer, is nation-wide.

The Military Telegrapher in the Civil War.

PART LV.

One of the most famous operators in the sixties and early seventies was Mr. W. E. Kettles, and his reputation as a telegrapher of the highest order was country-wide. He entered the United States Military Telegraph service in 1863 and while he did some military field work, his principal duties were in the War Department office at Washington. It was he who received the announcement of the fall of Richmond, and so great was the joy and excitement over the event that Secretary E. M. Stanton held young Kettles out of the window that the people might see the one who received the great tidings.

Modest men do not always appreciate their own achievements however momentous they may be. "Billy" Kettles was one of this class. In writing of his war experiences, this characteristic is shown, but his narrative discloses many interesting facts, which we give in part as follows:

"As to reminiscences," he says, "there were undoubtedly many, but in my case, few. Excitement was so general that we did not pretend to commit anything to memory unless it was very unusual. I worked the Harper's Ferry and Winchester wires while there was an engagement in progress with President Lincoln, Secretary of War E. M. Stanton and many others at my desk giving suggestions or orders, and the scene was wearing on any one. Imagination ran high under such circumstances.

"I was working the Fort Monroe wire on that good old morning in 1865 when Richmond fell, when Mr. William J. Dealy at Fort Monroe, called me excitedly and said, 'Sharpen for Richmond.' I sharpened, when the following message came:

'Richmond, Va.....1865.

'Hon. E. M. Stanton,
Secretary of War.

'We entered Richmond at eight o'clock this morning.'

(Sig.) G. Weitzel,
B. M. G. Commanding.

"Probably no other message, from that day to this, has contained news of such importance and interest. I took the message, the Lord only knows how, and distinctly remember upsetting the inkstand and instrument, I hurried to General T. T. Eckert's room, and started to give the message to the General himself, but it was hard to tell who actually did receive it from me, as President Lincoln sat close by and snatched it from his or my hand and ran into Mr. Stanton's room adjoining. To say the least, I was very much flustered; but I could stand it; everybody was in the same state of mind. Mr. Charles A. Tinker came in and looked out of the window. I shall never forget the scene which followed. There were the broad grounds of the government departments in front and there was but one person to be seen. He was walking slowly up the path, and happening to be an acquaintance of Mr. Tinker's, he naturally asked the news. It was too good to keep; and he got it. In less time than it takes to tell it there were crowds before us; and such a crowd! I am not able to describe the scene. You can break; you may shatter the wall, if you will but you could not count the people.

Secretary Stanton came in and General Eckert introduced him; Mr. Stanton snatched me in his arms, and held me out of the window at arms' length and told the crowd of the news I had received, how wonderful I was, etc. They wanted a speech; how they howled for that speech. In the next morning's *Washington Chronicle* the editor gave it to them after an interview with me."

Mr. Kettles is still living and resides in Boston, which city he has made his home for many years. Mr. Charles A. Tinker, former general superintendent of the Eastern Division of the Western Union Telegraph Company, New York, is living in retirement in Brooklyn, and Mr. William J. Dealy is still actively engaged in business, being general superintendent of the Commercial News Department of the Western Union Telegraph Company, New York.

Bridge Testing Set.

Specifications for the installation and operation of the bridge testing set used by the Western Union Telegraph Company has been issued by the office of the engineer of equipment.

Directions are given to make the Varley loop test and the metallic Varley test. The three-wire and the two-wire methods of measuring wire resistance are described in detail, and the method of locating a ground is gone into thoroughly. Three ways of locating crosses are described and under the head of "Location Tests under Unusual Conditions," are given directions for testing for high resistance faults and broken wires.

The subject-matter is illustrated by sixteen diagrams showing the form of test circuits, and these in connection with the text, present the subject in a very clear manner.

Telegraphy in Brazil.—The Brazilian Government has authorized the building of a telegraph line between Goyaz and Boa Vista de Tocantins. The equipment will be of English make.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 15th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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March 1, 1911.

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

Western Union Company Adopts a Day-Letter Service and Is Considering a Pension Plan.

Events of a radical nature are occurring with startling rapidity these days in the Western Union Telegraph Company's affairs. The night-letter service and the telephone-telegraph service, though in operation but a few months, have fitted in as part of the telegraph and telephone conveniences of the country, and the business community is utilizing these benefits to the greatest extent. Now come two other important announcements, viz.: A day-letter service and a pension plan for the benefit of employes.

The day-letter service, which went into effect March 1, is perhaps the most radical of all the recent innovations. The company will accept a message of fifty words or less, to be sent at its convenience, at a rate of one-half more than the existing night-letter rate. To state the matter in another way, a fifty-word day message will cost half as much again as a ten-word day message. The day letters must be written in plain language.

The effect of this new rate will be far-reaching and the question naturally comes to mind "How will the company be able to handle the enormous increase of business that will follow?" Along the same line of thought, machine or automatic telegraphy forces itself upon the attention, and it would not be surprising to hear, at any time, of the adoption of some high speed automatic system.

The other important action, that of establishing a pension system for employes, is one that will meet the approbation of employe and public alike, and is in harmony with the spirit of the times. There is no question as to the justice of a step of this sort. A man who has devoted his entire business life to the company's interests is entitled to some consideration when he becomes incapacitated for further service through old age or disability. While the pension plan is still in a formative stage there is no doubt that a practical system will be evolved and the Western Union Telegraph Company will take its place in the line of progressive concerns.

Messenger Boys' Clubs.

The welfare of the telegraph messenger boy is a live question at the present time, public spirited citizens and philanthropists vying with the telegraph companies in their efforts to elevate and protect the boys and put them in the way to become worthy employes and honorable members of the community.

It is alleged by many that the messenger boy has until recently been regarded with little consideration by the companies or the public. The companies, however, have long realized that the boy of today is the man of to-morrow, or in other words, the messenger of today will be the higher employe of to-morrow. Therefore, it is to their own advantage to train the boys for the business they have entered, and this they are now doing quite extensively. Better and improved quarters are provided for the youngsters, where they can read and learn the rudiments of telegraphy during their spare moments. It has been suggested that the companies might, with great advantage to themselves and to the boys, employ, more generally, capable teachers to instruct the latter in telegraphy and kindred duties. Such a course of action would arouse interest on the part of the boys and tend to make them more satisfied with their employment, especially when they realize that there is a future open for them.

In one city where the idea has been carried into effect, the manager invited the parents of the boys to visit the office and see how their sons were taken care of, and examine the facilities afforded them to learn telegraphy. The result was highly satisfactory as was evidenced by the increased number of applications for positions from parents of boys of high respectability.

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Another manager provided wholesome quarters and every facility for betterment with the result that the chief operator and all the operators, as well as every branch office manager in the city, began their careers as messengers, and the manager has never once found it necessary to employ any other than home people. He had, at the time he wrote, messengers in his employ who were capable of relieving the regular operators for meals and were waiting for the opportunity to be advanced to the position of junior operators.

Mr. C. P. Bruch, second vice-president of the Postal Telegraph-Cable Company, New York, says: "I am disposed to think that clubs for messengers would be very helpful to the boys, if properly organized and wisely managed, so as to provide interesting and healthful occupation for spare time, and an opportunity for education and training."

Naturally, those dealing directly with messenger boys are qualified to speak with authority on the subject. Mr. M. W. Rayens, general manager of the United District Messenger Company, New York, says: "I do not think that the club idea would be practicable here, as boys inclined that way have their own little clubs and associations, in close proximity to their homes, which they naturally seek in preference to what they might reasonably term a semi-charitable institution, and which would lead to nowhere. The boy is father to the man, on whom depends naturally the future of the race. But I think you will find on close observation that the so-called apparent movement in all directions for the training of messenger boys is largely in the interest of the companies rather than the welfare of the boy or the future of the race. Then why not go further, and instead of a club, organize great training schools and employment agencies, which would be supported by all employers, encouraged by parents and guardians, through which the boy might commence his career and be placed under some sort of voluntary beneficial supervision from the time he begins to earn a livelihood until he has reached man's estate; to such a place the employer might go with confidence and find the material required."

The objection to this suggestion, it seems to us, is that it is too general. An organization of this sort might prove unwieldy in practice, as it contemplates trying to accomplish a great deal. The companies would do better by concentrating their efforts upon their own interests, and then they would have control of all the forces that go toward building up their organization. The question is a large one and cannot be decided offhand. The main thing is to make it possible to secure boys of good character to start with and then afford every opportunity possible for improvement mentally, morally and physically. With such provisions it should not be difficult to secure boys of respectability, and thus the telegraph companies would be strengthening their own cause in a way that could not be accomplished in any other manner.

Capacity and Induction on Telegraph Circuits.

In the development of the practical utilization of alternating currents, some very interesting phenomena have been brought to light, which theretofore were barely suspected. Among them are capacity and inductive reactance and the effects of these are very marked indeed on alternating current circuits. On direct current lines, however, their effects are much less pronounced, and prior to the advent of multiplex telegraphy, these phenomena were practically ignored. With the coming of the duplex and quadruplex, however, the effects of capacity and inductance revealed themselves with pernicious activity and had to be dealt with as a real live problem. They have been generally regarded as necessary evils in the operation of multiplex circuits and consequently the remedy has been sought in their elimination.

Certain effects in the operation of multiplex apparatus have been ascribed to certain causes and in practice these assumptions appeared to be correct, but according to Mr. S. R. Beatty's investigations, as set forth in an article published elsewhere in this issue, telegraph engineers seem to have been wrong in their deductions and have confused causes and their effects. Mr. Beatty attempts to prove that the effects usually charged to induction are really due to capacity, and if further investigation proves this assumption to be correct, telegraph engineers will be compelled to revise their theory and practice of multiplex telegraphy.

A Model Organization.

Every one who has had any relations with the principal telephone company has not failed to notice on every hand the effects of scientific organization. System in its most highly developed form is the basis of this vast business, and its affairs seem to move with the greatest ease and freedom from friction. Indeed, without a scientific organization the affairs could not be conducted without confusion and disorder in such a complex business would occasion incalculable loss to the company.

Cohesion is one of the most noticeable characteristics among the company's vast army of employes. Each and every individual is loyal to the company and takes real interest in his duty. The company on the other hand takes interest in the welfare of its employes, and does what it properly can to make them satisfied.

It is evident that the interests that are now in control of the Western Union Telegraph Company have in mind a similar organization for the telegraph service and there is no doubt that if an *esprit de corps* equal to that prevailing in the telephone service can be established in the telegraph division its effect upon the telegraph business would be inestimable. The controlling interests should be as desirous for the good will of the employes as it is for that of the public. With both of these forces on its side the telegraph will be developed to its utmost possibilities.

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The Usefulness of Thinking.

BY MR. CHAS. P. BRUCH, SECOND VICE-PRESIDENT, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

In Northern New England, farming operations are practically suspended in the winter time. Somebody once asked an old lady (a farmer's wife) in that section, what she and her neighbors did to pass the time between fall and spring. She said: "Oh, we set and think—and sometimes we jest set!"

There are a good many other people, not living in cold climates, who just "set."

If I were to presume to offer advice to the younger men present here to-night, I should advise them to think.

I have had more or less to do with the management of a business in which there are several thousand employes, and much of the work in the executive offices is made necessary because some employes do not think for themselves. In fact, it is my observation that a large majority of people do not think, in the true sense of the word "They have eyes and they see not—they have ears and they hear not." Mentally they are like parrots. Their opinions are merely reflected from newspapers, magazines and books which they read. They do not reason out things for themselves. Even in their daily work they are little better than machines, and do things because they have always been done that way, or because someone told them to do that way. They make no effort to understand the reasons for the methods they are pursuing, or to comprehend the purpose of their work.

People like that never succeed; they don't even think far enough to understand why they don't succeed.

Men who succeed in any vocation are always men who think—men who study their work and try to find better ways of doing it; they search for the reasons.

If you wish to excel in whatever you undertake, you must observe, listen, study; use your brains and form your own independent conclusions. Your conclusions need not necessarily be different from the conclusions of other men; on the contrary, they will frequently be the same, because the other fellow has also "thought it out." But, don't accept conclusions merely because some other fellow thinks so. Try to find out why he thinks so. Get a clear understanding of the reasoning that has led him to his conclusions. And keep at it until you can either agree with him and adopt his conclusions as yours, or until you can give logical reasons for reaching a different decision.

But, thinking alone is not sufficient. Thought, without action, is worthless. "Be sure you are right, then go ahead!" Think things out and then act. And don't talk too much. I have noticed that the men who think the most, talk the least—but when they do talk, they are worth listening to.

Some people can talk a great deal without saying much. I have read that upon one occasion, Lincoln, who was engaged in a joint debate with an eloquent opponent, got up after the other man had finished and said something like this:

"My opponent has been very eloquent. He is a great orator—but he has not said anything. You have listened to him attentively; now I challenge any man in the audience to get up and tell us a single thing that he has said."

Although there were many in the audience who were of the same political party as the orator, not one man responded to Lincoln's challenge!

A great many people have the habit of talking without thinking, or of talking before they have thought enough.

I was once connected with a building association; the president was what some poet has described as a "Silent man who does things." The secretary was a good secretary; he wrote a beautiful hand, kept the accounts correctly and made copious minutes of the proceedings—and he also did most of the talking at the meetings. On one such occasion, the usually patient president remarked: "There is an old saying, that a man 'should think twice and speak once,' but I guess the secretary got it wrong end to!"

Think out your ideas, then carry them out, if you can. Talk about them only that other people may understand them and help carry them out. That seems to be the way to accomplishment.

In Bishop Fowler's lecture on Lincoln he tells another story that illustrates the difficulty of thinking and talking at the same time—and the futility of too much talking.

Lincoln said of a man who had great facility of speech, that he reminded him of a little steamboat that used to go snorting and cavorting up and down the Sangamon River, where Lincoln used to live; it had a six-foot boiler and an eight-foot whistle, and every time it blew its whistle it stopped!

Save the steam in your mental boiler and utilize it for progress. Don't waste it in making a noise!

I realize that what I am saying is not new, but I believe it to be true.

Think out for yourselves and decide for yourselves whether I am right.—*Abstract of address before a Men's Club.*

Night Work Among Telephone Girls.—In a recent address in New York, Mrs. Florence Kelley spoke on the subject of night work among telephone girls. She drew a parallel between the bill making it illegal for any male under twenty-one years of age to carry messages between the hours of 10 p. m. to 5 a. m. and the present law fixing the age required for girls employed in night work at sixteen years. She thought that girls should be as well protected as boys. Resolutions were passed asking that the National Child Labor Committee and the State Child Committee co-operate to investigate conditions of telephone night work and that the department of labor investigate conditions of night work for girls in general. This address was given before the New York State Consumers' League, January 30.

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Creosote Treatment for Poles.

In a paper read at the convention of the Colorado Electric Light, Power and Railway Association, Mr. George R. Ogier gave some interesting facts concerning the "open tank" process of treating poles with creosote. In the plant considered, the apparatus consists of three storage tanks, supported upon a platform high enough to allow the creosote to run by gravity into two treating tanks, one 10 ft. in diameter and 9 ft. high, and a rectangular tank, 12 ft. long, 4 ft. wide and 8 ft. deep. By the use of a derrick the treating tanks are loaded, oil is allowed to enter to a height in the tank sufficient to creosote the pole to the height stated in the specifications, which is about 6 ft. from the butt on a 25-ft. pole, treating all the buried end of the pole and to about 1 ft. above ground. The creosote around the pole is then heated to a temperature sufficient to open the pores in the wood and expel most of the air by expansion, thus forming a partial vacuum. This condition is then relieved by turning off the steam, and thereby stopping the hot bath. The hot oil is replaced by cool oil, which penetrates the pole while cooling is taking place. The duration of this cool bath is made sufficient to give the desired penetration for about a twenty-year service.

The theory of this process may be given in a few words: The heat of the preservative expands and expels a portion of the air and water contained in the cellular and inter-cellular spaces of the wood tissue, and when the cool creosote replaces the hot there is a contraction and condensation of the air and water which remains. To destroy the partial vacuum thus formed the liquid is forced by atmospheric pressure into the cellular and inter-cellular spaces, a process aided, of course, by capillary attraction.

The ease and effectiveness with which timber can be treated by this process depend upon the kind of wood, and whether it is seasoned or unseasoned.

The following is a table of data compiled by the United States Government showing the comparative life of untreated and treated poles:

	Average number of years untreated.	Average number of years treated
Cedar	12 to 15	25
Chestnut	8 to 10	20
Lodgepole pine ...	5	20
Western Yellow pine	6	25
Cypress	12	25
Juniper	10 to 13	25
Redwood	12 to 15	30
White oak	8	20
Douglas fir	8	20

Some of the above data is estimated from test lines put in by the United States Government in cooperation with the American Telephone and Telegraph Company in November, 1906.

The best available figures on the life of creosoted poles are from the German Postal and Telegraph Department, which, after 52 years of observation gives a life of 21 years for creosoted Baltic pine. The use of creosote for preserving timber has been shown by the experience of the English and French lines, to be beyond question a method which absolutely protects those parts injected with it. Creosote prevents that effect shown by intermittent wet and dry, and makes the timber waterproof.

One of the greatest advantages of creosote treatment for timber is that not only does it lengthen the life of timbers, but it makes the life of all kinds of timber practically the same, so far as decay is concerned.

In many cases the consumers require in their specifications, poles of larger diameter than the actual service requires, in order that a certain amount of deterioration by decay shall be allowable before replacement is necessary. For example, it is computed that a circumference of not less than 28 in. of sound wood in the pole at the ground line is required to support the strain to which the line is liable to be subjected, and the poles used have a circumference of 36 in. at the ground line; then 8 in. of deterioration, or the equivalent of a depth of decay of approximately 1¼ in., is allowable before replacement is required.

In some species otherwise durable, the sapwood decays very quickly. Untreated white cedar poles in Georgia, inspected after being set in line four years, showed 45 to 50 per cent. of the number with sapwood completely decayed at the ground line, which amounted to an average deterioration of 4 in. in the circumference, equivalent to an average depth of decay of fully ⅝ in. Cypress poles in Florida, inspected after being in the ground seven years, showed an average depth of decay of 0.8 in. at the ground line. The heartwood of these poles is sound, and in nearly all cases is of sufficient dimensions to meet the requirements of the line in which they are used, although graded by the butt circumference they fall decidedly lower than their original class. If poles, originally of the same grade represented by these poles after the sapwood has decayed, had been used, and the butts well treated with creosote so that their full size and strength would be maintained, not only would the poles be equally as strong as the ones now in use, but their ultimate life would be greater. The difference in cost between the two grades of poles in some cases would largely offset the cost of the treatment. It appears that pole users are paying money to secure large diameter sizes of poles in order to secure longer life, that might more profitably be spent for preservative treatment. The possibility of using lighter poles and giving them preservative treatment so as to maintain their full size and strength, is one that merits the attention of all pole users.

Mr. T. W. Goulding, European general manager of the Western Union Telegraph Company, London, England, in renewing his subscription for another year, writes: "I shall always be glad if you will have my subscription renewed should I overlook it, because I cannot get along without your paper."

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"Postal" Portable Quadruplex.*

BY LEONA LEMON.

When widespread calamities occur, the result of storm, flood or fire, the telegraph perhaps is relied upon to a greater extent than any other agency to spread the news and bring help. Such events are never scheduled and may occur in the large city, where telegraph facilities are abundant, or at some remote spot where they are very limited; but, whether in the city or village, a portion at least of the users of the telegraph, expect ample wire facilities almost immediately, and they are seldom, if ever, disappointed. Until a comparatively recent date, the opening of a temporary office of any consequence (and I believe the plan is still followed by some companies), meant the shipment of large quantities of battery material and instruments, all of which had to be tested and set up—a slow and expensive method. It is also necessary at times to greatly increase the telegraph facilities temporarily, because of conventions, athletic contests, etc. Realizing that a quicker and more simple method of providing temporary facilities was necessary, Mr. J. F. Skirrow, associate electrical engineer of the Postal Company, set to work, and the result is our present-day portable quadruplexes, which enable us to establish an office, wire or cable on the mountain top, on the deck of a boat, or at any other point where wire connection can be secured.

These quadruplex units are a combination packing box and table. The sides of the box drop downward and form the operating table, collapsible frames being used to support the boxes at the right height. The interior of the case is wired up with a standard quadruplex set and also with a pin jack equipment mounted on porcelain, so arranged that every connection that can be called for can be quickly made. A single Morse set is also included, arranged with a switch, so that a wire can be "singled" instantly. The sets are also fitted with miniature electric lamps, so that they may be set up in any convenient place and be ready for operation day or night.

The outfit comprises four quadruplex sets such as described; a 110-volt generator of 1.5 kw. capacity; three motor-generators transforming from 110 volts to 375 volts; a switchboard with ammeter, voltmeter, rotary voltmeter switch, etc., and an outfit of special stranded wire for making the connections. This stranded wire is cut up in convenient lengths fitted with plugs at each end. The connections from the switchboard to the sets and between the sets are made with plugs and jacks. This makes it possible to make all the connections between these sets that are possible at the switchboards in a terminal office.

The local instruments of the sets are wound to 150 ohms, and the 110-volt current direct from the generator is used to operate the locals and to light the quadruplexes. Two of the 375-volt motor-generators are used for the line quadruplex currents, the third being a spare.

The generator and motor-generators are mounted upon small trucks. The regulating rheostats are mounted on top of the machines. The machines are covered with oak cases that are bolted to the trucks. The generator switchboard is wired up complete and slides bodily into an oak case. Blue prints of all connections are pasted to the quadruplex switchboard cases.

The complete outfit can be set up and put in operation in fifteen minutes from the time it arrives at its destination, and can be packed up ready for shipment after operation has ceased in much less time.

A small kerosene engine is also used in connection with this outfit when it is impracticable to obtain power to operate the generator or motor-generators.

A combination set of repeaters which can be used either as a full repeater or two half repeaters, is also wired up in the same manner and is a part of the outfit. This is used when it is necessary to take care of single circuits by repeatering them into the quadruplexes.

The first occasion for the use of the portable quad sets was at Canton, Ohio, during President McKinley's obsequies. Since then they have been used at many places, but probably at no place where they were more valuable than at Baltimore at the time of the great fire in 1904.

Late Sunday evening, when it was apparent that the main office was doomed, an order was issued that four portable quadruplex sets be shipped from New York to Baltimore. Notwithstanding the congestion on the railroad, and the difficulties of obtaining trucks to haul the sets from the station to the temporary office, they were ready for use and put into operation on Monday afternoon. While these sets were in use at Baltimore, one of them was needed for exhibition at a dinner given by the American Institute of Electrical Engineers to Mr. Thomas A. Edison, at the Waldorf-Astoria Hotel, New York. It was taken out of service at Baltimore late Tuesday evening, set up and operated in the banquet hall on Wednesday evening, and put back into service at Baltimore in the forenoon of the following day.

These portable quadruplexes were also used to advantage during the International Yacht Races off Sandy Hook; at the Peace Conference at Portsmouth, on the occasion of Prince Henry's visit to this country when he christened the yacht "Meteor" at Shooter's Island, N. Y.; at the annual boat races on the Hudson River, near Poughkeepsie, N. Y., and on many other occasions of less general note, but of equal importance to the telegraph service.

*Postal Telegraph.

Jamaica's Telegraph Service yielded a profit of $32,940 during the last fiscal year. The telegraph is operated by the government in conjunction with the postal service, and the latter also showed a profit.

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Among Our Advertisers.

Under this heading we propose to keep our readers informed as to what the telegraphic and telephonic business interests are doing in the production of new apparatus. It will be a department worth reading, and will be of a newsy character. Advertisements of these concerns will be found on other pages.

Uncle Sam is a good customer of manufacturers of wireless telegraph apparatus, and Messrs. Foote, Pierson and Company, New York, are enjoying a share of his patronage. This firm has the best of facilities for manufacturing wireless apparatus of any power and the fact that the United States government gives them contracts for such equipment is sufficient evidence that they do first class work, for Uncle Sam will have nothing but the best. The Argus lightning arrester holds its own against all competitors and is a standard device. The demand for these instruments will soon be on the increase, as the lightning season advances, and the firm is all ready to meet it. This company manufactures an extensive line of electrical apparatus, and its laboratory instruments, X-ray outfits, photometers, etc., are among the best made. Mr. H. G. Pierson is the son of one of the original manufacturers of telegraph apparatus. His father had a large shop in Cleveland, Ohio, in the same building where the late J. H. Wade, one of the first early presidents of the Western Union Telegraph Company, had his office.

The Edison primary battery, manufactured by the Edison Manufacturing Company, Orange, N. J., has long occupied a position among standard electrical devices, and the field for it is constantly enlarging. The position of the elements in the cell is such that the internal resistance is practically eliminated. As regards internal resistance this battery compares with the electric generator. The battery gives a powerful output on demand, and the cost of maintenance is stated to be less than that of any other battery. These are all good points.

Many things are made by machine these days, even to the dots and dashes of the Morse characters on telegraph lines. The little machine known as the Mecograph is a semi-automatic sending device. It must be controlled by the operator but it does the work. The Mecograph has brought back to many operators afflicted with telegraphers' cramp the ability to earn a living. It not only helps the unfortunate ones, but it enables sturdy operators to do better by increasing their working speed.

The Mecograph Company, 321 Frankfort Ave., Cleveland, Ohio, will be glad to tell any one interested all about this machine.

There is a great demand for telegraph engineers, men who know the whys and wherefores of the telegraph. Every ambitious operator cannot know too much about the business that brings him his living. An excellent opportunity to learn all about telegraphy is offered by the International Correspondence Schools of Scranton, Pa. The course does not teach operating telegraphy, however. Its object is to fit operators for higher positions by teaching them the things about the technical features of the business that they must know to enable them to rise higher in their profession. This knowledge can be obtained without loss of time during business hours.

To paraphrase a common expression, what Mr. William Marshall don't know about electrical condensers is not worth knowing. Mr. Marshall has been making condensers for many years and his customers are those who must have first class instruments. His condensers are never found on bargain counters and cannot be bought in job lots. He makes wireless telegraph condensers that will stand any voltage used in this line of work. His condensers are found in telegraph offices all over the land and are used in submarine cable work. Marshall condensers are also found in laboratories where exacting requirements are demanded.

Secret Telegraphy.

Mr. Patrick B. Delany, of Nantucket, Mass., the well known old-time telegrapher and inventor, was granted a patent on January 17 on a system of secret telegraphic transmission which possesses some novel features. The transmission involves the use of two wires or circuits and the system is not intended to be used for ordinary commercial business, but rather for private circuits and on occasions when secrecy without the trouble and delay of conversion of messages into code and the loss of time in deciphering is desirable, and where the absolute protection gained would more than warrant the use of an extra wire. The result is accomplished by sending the dots and the dashes of the Morse code over separate wires and if necessary over different routes to the point to be reached. Thus a message for Chicago might have the dots go via Albany and Buffalo, while the dashes were sent via Philadelphia and Pittsburg, both to reach the receiver at Chicago in their regular order to form Morse characters or letters precisely as though they had come over a single wire in the ordinary way, or instead of sending the dots over one circuit and the dashes over another, the impulses, whether dots or dashes comprising a letter, may be alternated over the two circuits. The arriving signals are recorded in their proper sequence by a common receiver exactly as if they had been sent over a single circuit in the ordinary way.

This system may be applied to quadruplex, duplex, multiplex or any circuits however organized. In the case of a quadruplex it is only necessary to make both receiving relays operate the same sounder, or the receivers of two duplex circuits may be combined to work a single sounder in the same way.

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Physical Tests of Wire and Insulation.

Mr. Hugh T. Wreaks, secretary of the Wire Inspection Bureau, New York, read a paper on "Wire Inspection" at the recent convention in Chicago of the National Independent Telephone Association.

In regard to braided wire, Mr. Wreaks pointed out that the function of the braid is to add strength to the wire and to serve as a protector to and prevent the action of air on the compound or conductors underneath. Rubber insulation, both low and high grade, has been in the past, and is even now to a greater or less extent, a bone of contention between purchasing agents and wire manufacturers. The characteristics of a good compound are high insulating qualities, long life, both physical and electrical, and sufficient strength to withstand without damage such handling as it will receive when being installed. The quality of strength is not so important, especially when the insulation is covered by a braid. There are, however, many engineers who claim that a relation exists between electrical, physical and aging qualities of a rubber insulation, but the Wire Inspection Bureau has made a number of experiments along these lines without discovering any such relation.

The physical tests on ordinary-grade insulation were classified under three heads: hardness, flexibility and softness. The test for hardness requires no apparatus except a sharp knife and a little practice, and consists in carefully removing the braid and then wrapping the insulation on itself and seeing that no cracks develop in less than twenty-four hours' time. The test for flexibility consists in wrapping the insulated and braided wire under tension around a small mandrel immersed in water and measuring by electric tests the damage, if any, that has been done. Tests for softness are made directly on the insulation and, by means of an electric current and a scale, tell how many pounds' pressure it takes for a given tool edge to cut through the insulation. Physical tests on high-grade insulation are usually of the nature of a stretch-and-return test, say, from 2 in. to 6 in. and return in one minute to 2¼ in., then a stretch without breaking to 9 in. The tests also call for a breaking strain of about 800 lb. per square inch.

Tests for both soft-drawn and hard-drawn copper wire are in the main alike in kind, but different in degree, elongation tests and breaking-strength tests being required for both, and a twisting test being called for for soft copper. Hard copper, again, must be carefully observed for splinters since these are very dangerous to the linemen in handling the wire. Physical tests on soft-drawn wire, except in large sizes, need only simple apparatus. Conductivity tests are also specified for both soft-drawn and hard-drawn wire, although for the former they are of less importance as practically all copper when soft has a conductivity above specifications.

Tinning on wire is put on not only to preserve the copper presumably against any action from free sulphur or oxidizing agent in the rubber compound, but also to protect the copper from the air in case the braid or compound on the wire is damaged in spots. A chemical test for tinning is made by alternate immersions in a solution of hydrochloric acid and a solution of sodium sulphate of stated strength and for stated periods of time. Another test specified is to band the wire around a given mandrel, depending upon the size of the wire, and then immerse the wire in the sodium solution for stated intervals.

The Brown Telephone Relay in Wireless Telegraphy.

In our issue of September 16, 1910, was printed an illustrated description of a telephone relay invented by Mr. S. G. Brown, London, England, which instrument has attracted much attention in technical circles. In a letter to a London electrical paper, Mr. G. W. O. Howe describes some experiments made with one of these relays in connection with the wireless telegraph installation at the Central Technical College, at South Kensington, near London. One of the aerials at the College consists of a single wire suspended between a chimney stack on the college and the tower of the Imperial Institute. The length of the span is about 530 ft., and the height of the upper end about 260 ft. When it was erected it was thought that it might be possible to pick up the signals sent out from the transatlantic station at Glace Bay, Nova Scotia. The distance is about 2,400 miles. No success attended these efforts, however, even with special apparatus designed for the purpose, until a Brown telephone relay was introduced between the detector and the telephone receiver. With this arrangement the Glace Bay signals can be heard quite distinctly at night, but, on account of atmospheric disturbances, they are not always readable. When the other transatlantic station at Clifden, Galway, is working, one can put the telephone receiver on the table and walk to the far corner of the room, 30 or 40 ft. away and still read the signals with ease, even when the primary and secondary coils of the receiving transformer are 4 ft. apart. Under similar conditions without the telephone relay, the receiver has to be held near the head. The fundamental wave length of the aerial is about 900 metres, while the wave length employed by Clifden and Glace Bay seems to be about 6,100 metres. These results show that a telephone relay is an important addition to a wireless station receiving very weak and hardly readable signals.

Public Service in Alabama.—In his annual message Governor O'Neal, of Alabama, suggested that the powers of the present Railroad Commission be so enlarged as to embrace telephone and telegraph companies, with full power after hearing to adjust and regulate rates.

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Legislative Attacks Upon Telegraph and Telephone Corporations.

An idea of how widespread is the mania of attacking corporate telegraph and telephone property through legislative enactment may be gleaned from the following, which represent only a few of the cases brought to our attention.

A bill has been introduced in the Pennsylvania Senate, giving third-class cities and boroughs the right to compel telephone and telegraph companies to place their wires in conduits and empowering municipalities to condemn and purchase such conduits when desired.

In the Massachusetts legislature, Mr. James H. Knight on behalf of the United Improvement Association, Boston, has petitioned for a number of bills relative to the proposed new telephone rates and to the supervision of telephone and telegraph companies.

In Washington City telephone and telegraph companies, including wireless concerns, engaged in interstate commerce are contesting the right of the Interstate Commerce Commission to require them to publish schedules of their tolls. A hearing has already been held, and the commission expects to take the matter up for definite settlement at an early date.

In Oregon the constitutionality of the state law enacted by the initiative and referendum is attacked by the Pacific States Telephone and Telegraph Company. The case is now before the United States Supreme Court for final adjudication. In the legislature of the same state, Representative Amme has introduced a bill to nullify the contracts printed on the backs of telegraph blanks and holding the companies responsible for actual damages caused by the delay in transmission of messages, or errors.

In Texas a bill has been introduced in the legislature making all telegraph companies liable for damages for mental anguish or suffering, even in the absence of bodily injury or pecuniary loss, for neglect in receiving, transmitting or delivering messages.

In the matter of the Cumberland Telephone and Telegraph Company on the readjustment of exchange rates the Louisiana Railroad Commission has amended its order of last year providing that certain monthly rates are subject to a monthly discount of fifty cents if paid quarterly in advance.

The latest freak from Kansas is the demand from a farm paper in that state that square instead of round poles be used by telegraph and telephone companies. At a great expense of gray matter the writer of the article has come to the conclusion that the square pole would avoid the necessity of walking around the pole to read sale-bills tacked thereon. He also tells the world something that it did not know before, that "there is no more wood in a square pole than in a round one, and a square pole can be made just as tall as a round one." He clinches his argument with the assertion that it is just as easy to dig a hole for a square pole as for a round one.

The borough of Washington, Pa., is seeking to collect a pole tax from the Western Union Telegraph Company and the Central District and Printing Telegraph Company, due under an ordinance. The companies contend that the tax is unreasonable and excessive.

In California a bill has been introduced in the legislature proposing radical changes in the stringing of power, telephone and telegraph wires in that State. The bill requires a distance of 13 in. between the pole and a wire, making a space of 26 in. in which the lineman will be free to work. Cable lines are to be strung on crossbars, instead of along the poles on brackets, and laterals from underground conduits to the crossbars of poles must be incased in wooden casing of 1½ in. thickness.

What the Telegraph Says.

Telegraph "bulls" are always a source of amusement and frequently a source of annoyance to the parties concerned.

Recently one of the women operators at a relay office was handling a night letter telegram in which a western firm was apparently ordering twenty-five dozen men's "ball-bearing" underwear, to be shipped at once. She, however, guessed that the gentlemen were not at present wearing that kind of a garment, and sent the message back for correction. The firm's order was for balbriggan underwear.

It is not recorded what happened to the wheat market when an order was received by a commission house to "buy 8 Drew Heat," but when the tangle was straightened out the order read, "buy 8 Dec. wheat."

The sporting editor of one of the press associations found in a report of a horse race the name of a horse he had never heard of, namely "Side Fence." On investigation it was shown that the horse's name was "Defence," the "si" being the character for a semicolon preceding the name.

There are various kinds of drunks, but a "cylindrical" drunk is in a class by itself. The chief of police at New York telegraphed to the chief of police at Albany to apprehend a man on a certain train with a cylindrical trunk, but when the Albany chief received the telegram the fugitive had a "cylindrical drunk."

Our old friends, "Jags is not 100," for "James is not well;" "Real & Tate" for "Real Estate," etc., bear repetition occasionally to chase away the blues.

Conscience Stricken.—A telegraph operator who had worked for commercial and railroad companies and who recently became a missionary in China has returned a small sum of money to a railroad company to be added to its "Conscience Fund." He states that he owed the company that much money and he felt that he could not continue to do missionary work until this debt had been paid.

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Multiplex Telegraphy.

BY S. R. BEATTY, OF NEW YORK.

Articles on multiplex telegraphy have appeared from time to time in the columns of Telegraph and Telephone Age, but there are several phases of the subject which I have never seen alluded to. One of these is how to determine the value of current on a duplex or quadruplex circuit while in operation. The general opinion is, that, owing to the self-induction of relays, the value of the current cannot be ascertained except during periods of inaction, and then by Ohm's law. Besides the solution of problems of the current, there are a number of conditions, both electrical and magnetic, which are equally puzzling.

It seems to be the prevailing idea that multiplex telegraphy has reached the zenith of its efficiency, in fact, that it is on the wane, and so firmly has this belief become established that an article on "The Passing of the Quadruplex," appeared in Telegraph and Telephone Age a couple of years ago. There is no doubt whatever that conditions have arisen within the past ten years which have proven very detrimental to telegraph circuits. All of these, however, are not extraneous by any means. Multiplex circuits possess certain inherent qualities which can be utilized in overcoming conditions inimical to their operation, which have developed in recent years. The efficiency of multiplex circuits has been decreasing gradually until now it has reached a low figure, and the situation is becoming serious. There is no disguising this fact.

So far as the self-induction of the relays on multiplex circuits is concerned, it is not the bugaboo that it is generally supposed to be. Its effects are known and can be calculated in ohms.

Multiplex circuits are installed and operated according to Ohm's law, as if there were no other conditions to be considered other than the ohmic resistance of the circuit. Except for long circuits the ohmic resistance is of secondary importance. Multiplex circuits contain three factors, viz.: resistance, self-induction and capacity, the latter being of the greatest importance. In such circuits Ohm's law does not obtain, neither does Helmholtz's law, expressed as

$$It = \frac{E}{R}\left(1 - e^{-\frac{R}{L}t}\right)$$

which gives the current value time t, seconds after closing the circuit. This law applies to inductive circuits only. Neither does the formula

$$It = \frac{E}{R} e^{-\frac{t}{RC}}$$

which applies only to circuits containing capacity. Moreover, owing to the small currents used on telegraph lines, the negative power in each formula will give a negative characteristic of the logarithm of such a small quantity as to render the calculation impracticable.

The current on multiplex circuits being alternating in character, although furnished by direct current generators, is therefore pulsatory. This characteristic of the current in addition to the manner of its impression on the circuit will not give a true sinusoidal wave similar to that given by an ordinary alternating current; there is, however, a growth and decay of the current which will very nearly approximate a sine wave. Therefore, we are justified in applying to multiplex circuits the laws which govern alternating currents, and are thus enabled to determine the current and also understand certain other conditions of these circuits while they are in operation.

The self-induction of a relay depends on the flux density, which in turn depends on the magnetizing current, the length, cross-sectional area, permeability and reluctance of the various parts of the compound magnetic circuit, including the permanent magnet, air-gaps and joints (the latter being reckoned as air-gaps) and the total number of turns.

The electrostatic capacity of the line is distributed along its entire length, and very unevenly at that. It depends on a number of conditions among which are circular-mil area of the conductor, the area of surface exposed to other conductors, whether adjacent conductors are grounded, the number of inators per mile and their insulation resistance, the specific inductive capacity of the insulating material (if the conductor is insulated), and the distance from other conductors and the earth. The reactance due to capacity, like that due to self-induction, can also be calculated in ohms. These reactances have opposite effects: that due to capacity gives a leading current while the reactance due to self-induction gives a lagging current. In any alternating current circuit where self-induction and capacity are present they tend to neutralize each other and if that is accomplished, Ohm's law obtains; that condition, however, is very rarely attained.

One or two illustrations of the application of the laws governing alternating current circuits to multiplex circuits in operation will make the foregoing more clear, besides explaining some of the phenomena attending the operating of such circuits. It should, however, be stated at this point, that it is impossible to make absolutely accurate tests of multiplex circuits in operation (especially those which are operated manually), that is to say, the values given will not be dead-beat values, owing to the irregular frequency and also to the manner in which the current is applied. But for a given frequency, other conditions remaining unchanged, the values given will be correct, and for automatic circuits the values will be even more accurate.

In determining the self-induction of the relay it was necessary to assume a flux density in order to obtain a working hypothesis so as to be able to ascertain what flux density a given magnetization would maintain in the compound magnetic circuit,

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and, as already mentioned, each part had to be calculated separately, making use of magnetization curves. The process was difficult and required great care. Assume a duplex circuit 345 miles in length, ohmic resistance 4,500 ohms, e.m.f. 200 volts, current 44 milliamperes (Ohm's law) and capacity 4.08 microfarads. A speed of thirty words per minute will give a frequency of 7.5 cycles per second. The magnetizing current of 44 milliamperes will give approximately 4,000 magnetic lines of force, that is, the flux density would be that value all the time if the current remained 44 milliamperes during the operation of the circuit, but such is not the case. This magnetomotive force of 4,000 lines will give the self-induction of the relay as 2.53 henrys. We now have all the requisite values.

The impedance of a circuit containing resistance, self-induction and capacity is equal to the square root of the sum of the squares of the resistance and the difference between the reactance due to self-induction and the reactance due to capacity and is that quantity which, multiplied by the current, gives the e.m.f., therefore

$$I = \frac{E}{\sqrt{R^2 + \left(2 \times 3.1416 \times n L - \frac{1}{2 \times 3.1416 \times n C}\right)^2}}$$

Where n=Frequency.
L=Coefficient of self-induction.
C=Capacity in microfarads.
therefore,

$$I = \frac{200}{\sqrt{4{,}500^2 + \left(2 \times 3.1416 \times 7.5 \times 2.53 - \frac{1}{2 \times 3.1416 \times 7.5 \times 4.08}\right)^2}} =$$

$$\frac{200}{\sqrt{20{,}250{,}000 + (119.22 - 5{,}201)^2}} =$$

$$\frac{200}{\sqrt{20{,}250{,}000 + 25{,}826{,}724}}$$

Hence,

$$I = \frac{200}{6{,}787} = 29 \text{ milliamperes.}$$

The reactance due to self-induction equals 119 ohms, while the reactance due to capacity equals 5,201 ohms, 701 ohms greater than the ohmic resistance of the circuit and 43.7 times greater than the self-induction. The decrease in the current to 29 milliamperes will reduce the magnetomotive force to about one half, which would make the self-induction 1.92 henrys. This would increase the impedance of the circuit about 29 ohms, thus making no appreciable difference in the current value. This decrease in the flux density however, has a marked effect on the efficiency of the circuit which will be referred to later.

The reactance due to capacity being in excess of that due to self-induction, indicates that the current is a leading one, or ahead of the e.m.f. by a given angle, which can be calculated in degrees as follows:

The e.m.f. necessary to overcome resistance = 4,500 × .029 = 130.5 volts.

The e.m.f. necessary to overcome self-induction = 119 × .029 = 3.45 volts.

The e.m.f. necessary to overcome capacity = 5,201 × .029 = 150.8 volts.

The resultant component at right angles to the current = 3.45 — 150.8 = — 147.35

Hence tan $\phi = \frac{147.35}{130.5} = 1.12911 = 48° 18'$ or 48 degrees ahead of the current.

Again assume another duplex circuit of 90 miles in length, ohmic resistance 2,500 ohms, e.m.f. 140 volts, current 56 milliamperes, capacity 1.24 microfarads, frequency 7.5 per second. This current value will give a magnetomotive force of approximately 5,000 lines (if the current were steady) and a self-induction in the relay of 2.32 henrys, therefore

$$I = \frac{E}{\sqrt{R^2 + \left(2 \times 3.1416 \times n L - \frac{1}{2 \times 3.1416 \times n C}\right)^2}} =$$

$$\frac{140}{\sqrt{2{,}500 + \left(2 \times 3.1416 \times 7.5 \times 2.32 - \frac{1}{2 \times 3.1416 \times 7.5 \times 1.24}\right)^2}} =$$

$$\frac{140}{\sqrt{6{,}250.000 + (109 - 17{,}114)^2}}$$

hence,

$$I = \frac{140}{17{,}187} = 8 \text{ milliamperes.}$$

In this case may be noticed the exceedingly high value of the reactance due to capacity.

The reactance due to capacity = 17,114 ohms.

The reactance due to self-induction = 109 ohms.

The angle by which the current leads the e.m.f. is obtained in the same manner as in the first case.

The e.m.f. necessary to overcome resistance = 2,500 × .008 = 20 volts.

The e.m.f. necessary to overcome self-induction = 109 × .008 = .872 volt.

The e.m.f. necessary to overcome capacity = 17,114 × .008 = 136.9 volts.

The resultant component at right angles to the current = .872 — 136.9 = — 136.028. Hence the angle of lead =

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$$\tan \phi = \frac{136.028}{20} = 6.80140 = 81^\circ\ 38'.$$

The angle of lead in either illustration could have been obtained by using the following formula:

$$\tan \phi = \frac{2 \times 3.1416 \times n\ L - \frac{1}{2 \times 3.1416\ n\ C}}{R} =$$

$$\frac{17{,}005}{2{,}500} = 6.802$$

which would give the same value, viz.: 81° 38′.

In an alternating current circuit containing resistance, self-induction and capacity, the angle of lead or lag may vary 90° either way.

In circuits similar to the one mentioned in the second example, where the capacity is very low, the condenser action of the circuit is correspondingly low; the breaking of the circuit at each alternation causes the impedance to become infinitely large and the current drops to a very small value, in some cases almost to zero.

In quadruplex circuits the same conditions exist and the same principle obtains. The self-induction of the neutral relay, however, is very much greater than that in the polar relay, being approximately 5.07 henrys with a magnetizing current of 60 milliamperes. This value of 5.07 henrys for the neutral relay was obtained by a series of tests on quadruplex circuits taking the values obtained thereby and calculating backwards. This was necessary because of the fact that it was impossible to obtain any measurements whatever of the magnetic circuit in this relay. The value given is approximate. But verifying the calculation from an assumed measurement as close as it was possible to judge it, by careful observation, the value of 5.07 henrys will be found substantially correct.

The time constant of a circuit is the ratio $\frac{L}{R}$, but it will be found that this will not apply to multiplex circuits because of capacity which has a much greater effect than self-induction. It does, however, apply to the relay, apart from the circuit.

Sparking at pole-changer points has been said to be due to a variety of causes, including self-induction, also to a series of rebounds at the instant of contact and then again to the discharge of the main and artificial lines. There is no sparking due to self-induction and a careful study of the circuit will show that sparking from this source is impossible. There are sparks at both points of the pole-changer and both are from the same cause. When the pole changer is opened and closed rapidly the spark made by the contact when the current is reversed is confusing to a good many people and is generally taken to be at the "break" of the circuit. It is made at the "make" of the circuit at the reversal of the current, and both sparks are due to capacity reactance. The method usually adopted for the elimination of this spark is by means of a grounded condenser, which is only a makeshift, as it has no effect whatever on the capacity of the line, which is the thing to consider.

In the operation of the circuits there is a great lack of uniformity; in fact, there is a medley of ideas, conforming to particular opinions of each office.

Suppose a circuit will not give good results with a given voltage; the voltage is increased until satisfactory results are obtained when the circuit will then probably be carrying a current value of over two hundred to three hundred per cent. in excess of the carrying-capacity of No. 36 wire. In fact, it requires a higher voltage to operate a short circuit in proportion to that necessary to work a long circuit. Ocasionally we read of the destructive effect of sparking, the heating of relays and the high voltages necessary nowadays. In the case of a quadruplex circuit sometimes the neutral side has to be closed in order to get a good duplex out of the polar side, notwithstanding the fact that there is current enough on the circuit according to Ohm's law to make it work four cornered, there being no unfavorable conditions so far as wire or weather conditions are concerned. (It would be very interesting to know the number of abandoned common sides due to this cause alone.) Sometimes a change of sets will obviate this condition; if so, the matter rests there; and it is considered lucky to have overcome one of those "necessary evils" of quadruplex working, by so easy a method, but the real cause of the trouble is still unknown.

It should be remembered that the permanent magnet of a polar relay plays a very important part in the operating efficiency of the circuit and that the pull on the armature is proportional to the square of the flux. Suppose the flux in the permanent magnet is 500 lines and the flux in the cores of the relay 500 lines (about 8 milliamperes) then we have $(500 + 500)^2 = 1{,}000{,}000$ lines. If the flux in the cores be increased to 2,000 lines (about 30 milliamperes) this will give us $(500 + 2{,}000)^2 = 6{,}250{,}000$ lines. If the flux in the permanent magnet is 2,000 lines and the flux in the cores 500 we will then have $(2{,}000 + 500)^2 = 6{,}250{,}000$ lines, thus getting the same pull with one fourth less current. We can now see how the circuit has been greatly impaired in the effort to get rid of a condition which was apparently very little understood.

It is also advocated that the cores of relays should be laminated in order to overcome the effects of hysteresis and eddy currents, which produce heat in the cores. This is another condition which is not understood apparently. The cores of relays are worked greatly below the saturation point and the heating is due to the abnormal currents, especially when the circuit is inactive. Hysteresis and eddy currents have nothing to do with it. Steinmetz gives the following formula to determine the power in watts lost by hysteresis:

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$$P = \frac{K\ V\ B^{1.6}\ n}{10^7}$$

Where P = Watts lost due to hysteresis.
K = a constant depending on the magnetic qualities of the iron.
V = Volume of iron in cm.
B = Maximum magnetic density per square cm.
N = Number of cycles per second.

Thus for a circuit with a potential of 140 volts and 56 milliamperes the loss would be

$$P = \frac{.003 \times 5{,}000^{1.6} \times 4.6 \times 7.5}{10^7} = .173 \text{ watt}$$

or the .022 of the power in the circuit (taking .003 as the constant for soft iron), which proves how unnecessary it is to laminate the cores.

Polar relays should be handled with great care and not subjected to rough usage, such as is frequently accorded them. When being handled, each jar or blow has a demagnetizing effect on the permanent magnet which indirectly affects the efficiency of the circuit.

In adjusting the neutral relay the theory is advanced that it is necessary to remove the left hand or repelling coil further from the armature than the right hand or attracting coil, because the repelling pole has more effect at a greater distance. This theory is not in accord with the laws of the magnetic circuit. Gauss, Maxwell and other scientists have verified the law of inverse squares as set forth by Coulomb, that "magnetic attractions and repulsions are inversely as the square of the distance." It is impossible to obtain a magnet having unequal poles either by means of magnetization or by any other method, consequently in a uniform field the intensity of each pole is exactly the same and is inversely as the square of the distance. The fields set up by the poles of the neutral relay are uniform. In the neutral relay the signs of the poles in the right hand coil and those of the armature coil are always opposite while the signs of the poles in the left hand coil are similar to that of the armature, further the signs of the poles in the two coils are always opposite, hence there are two magnetic circuits and if the two coils are equi-distant from the armature, there is a leakage between the two coils, and the effect on the armature is obvious.

It is problematical if there is not a leakage even under the most favorable conditions, that is, when the left hand coil is removed a distance from the armature, as lines of force are vector quantities. Kohlrausch has shown that the distance of the poles from the ends of a bar magnet is about one twelfth the length of the bar, as far as its action at a distance is concerned.

The subject of multiplex telegraphy is so far-reaching, inasmuch as it necessarily involves everything pertaining to the circuit, that it is impossible to do more than touch upon the matter in a cursory manner in the space of a short article. This much can be said, however, that if properly handled, the excessive voltages and abnormal currents can be reduced besides increasing the efficiency of the circuit and even going so far as to reduce the weight of copper in the conductors, an item in itself of no small moment, besides the elimination of other very detrimental conditions.

Radio-Telegraphy.

Noiseless Vacuum Spark Gap for Wireless Telegraphy.

A patent (No. 981,503) was issued January 10, to Dr. Harry F. Waite, New York, for a vacuum discharge spark-gap in wireless telegraphy. This simple device, as constructed, eliminates all noise and the familiar loud cracking sizzle heretofore so annoying in the operation of wireless transmitting apparatus. This gap consists of two vacuum chambers, each having an upper electrode of iron and a lower electrode of mercury. There is also an automatic vacuum regulator on each chamber which keeps the internal resistance constant when connected. In the closed circuit of an ordinary sixty-cycle wireless transmitter it exhibited all the properties of the ordinary gap. It transferred energy from the closed to the open circuit or antenna, the same as in the ordinary gap. Although with a given transmitter and antenna, the radiation value of the current at the base of the antenna was somewhat less than that of the ordinary spark gap, yet the effective range of the transmitter was identically the same on an aerial test.

Another interesting and highly desirable effect in wireless was noted, namely: that the radiated wave train was very slightly damped; in fact, the logarithmic decrement of damping was approximately .06, whereas with the ordinary spark gap the radiated wave train had a decrement of .12. Only one wave length was emitted on the antenna even when using the direct connected helix.

This vacuum gap has also been tried on sets using various primary frequencies from 60 to 500 cycles and it appears that the best results will be obtained on the higher frequencies. Varying secondary voltages have been used from 10,000 to 35,000 and the gap was effective over this wide range. Tests have also been made using several sets in multiple. The gap is kept cool by immersion in either oil or distilled water. It is absolutely noiseless in operation, and will doubtless have a useful field.

Three Thousand Lives Saved by Wireless.—A rough calculation has been made recently as to the success and value of the assistance rendered by wireless telegraphy to ships at sea in the saving of life, and it is computed that 3,000 persons owe their continued existence at the present time to the help rendered by wireless.

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Wireless Telegraphy in Uruguay.—The Republic of Uruguay has placed a contract with the Berlin Telefunken Gesellschaft for the supply and erection of seventeen wireless stations within its territory.

Wireless for the Protection of Seal Fisheries.—The United States government is considering plans to establish wireless telegraph service to connect the Pribyloff Islands, off the coast of Alaska, with the main land, for the protection of the seal fisheries.

Wireless in China.—The only notable addition to the Imperial Chinese telegraph line in 1909 was the installation of a public wireless telegraph station at Shanghai. Communication can be had with ships at a distance of 150 miles.

Wireless in Sweden and Norway.—The largest wireless station in Sweden—erected by the Telefunken Company, near Gothenburg—with a radius of action of 1,250 miles, has been opened. It belongs to the State, and will serve mainly military purposes. A station of 620 miles radius is to be erected at Bergen.

Wireless in India.—The Indian Government has placed a contract for the erection of wireless stations at Calcutta, Delhi, Allahabad and Simla. The stations will be employed mainly for military and official purposes, and will have a range of 600 miles each, except that at Simla, which will have a range of 300 miles. The cost will amount to $250,000. The Marconi Wireless Telegraph Company, Limited, will erect the stations.

Wireless Communication with Flying Machines.—Experiments are being carried out near Versailles by M. Maurice Farman in connection with the establishment of wireless telegraphic communication between a flying aeroplane and the earth. The aviator has already succeeded in transmitting messages from his machine to a point ten miles away, and is conducting experiments in an endeavor to receive on, as well as transmit messages from, his machine.

Storm Warnings by Wireless.—The German wireless telegraph station at Norddeich has been ordered to send storm warnings by wireless and short weather reports twice daily over the North Sea and the western part of the Baltic Sea. As, however, the smaller fishing craft, for whose benefit these warnings are specially intended, are not provided with wireless apparatus, ships receiving these warnings and reports by means of their wireless equipment are required to communicate them to neighboring ships by optical signals.

The Eiffel Tower as a Center of Wireless Communication.—The results of recent experiments go to prove that if the Eiffel tower were somewhat more centrally situated on the earth's surface it might prove to be the centre for a world-wide system of communication. The range of communication from the tower is gradually being extended, and embraces a wider radius at each new effort. The tower is the object of much attention just now, and its wireless equipment promises to become by far the most important and extensive in the whole world.

Wireless in Marine Wrecking Work.—The value of wireless telegraphy in marine wrecking operations was demonstrated recently in the salvage of the French steamer *Louisiane* which was driven ashore near Key West in a hurricane. The wrecking tug *Relief* was employed more than three months in the work of saving the stranded ship and was during that time in constant communication with shore.

Wireless Telephony on Moving Trains.—Dr. F. H. Millener described his method of installing wireless telephones on the trains of the Union Pacific Railroad at a meeting of the New York Railroad Club, February 17. About 300 railroad and traction officials were present. Communications between moving trains and signal towers have been held over distances varying between 500 feet and thirty-five miles. "The ether waves," the speaker stated, "seem to tend naturally to take the direction of the track. Instead of wire antennae a steel-ribbed umbrella had sometimes been used." The Union Pacific Railroad Company is still carrying on the experiments, but has not yet equipped any of its cars with the system.

Wireless Telegraphy in China.—Wireless telegraphic communication will soon be established between Hong Kong and Hanoi, China. Wireless service is projected in Indo-China between Saigon and Hanoi a distance of about 1,000 miles; also from Hanoi to Quang-chung-wan; from Hanoi to Lang Biang; from Lang Biang to Saigon; from Lang to Vientaine; and others from Saigon to Pnompenh and Battambang. The Chinese Government is also constructing systems in Yunnan toward Tibet and in Tibet proper, which it is expected will be within reach of the lower coast French and English systems. There is a movement on foot to establish wireless communication between Hong Kong, China and Singapore, Java.

Underwriters' National Electric Association.

Mr. C. M. Goddard, secretary of the Electrical Committee of the Underwriters' National Electric Association, Boston, Mass., has issued a bulletin containing the committee reports and suggestions for changes in the National Electrical Code, which will be considered at the meeting of the Electrical Committee in New York, March 22 and 23. The report of the committee on wireless telegraph apparatus will also come up for consideration at the meeting.

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The Railroad.

Mr. John L. Davis, president of the Association of Railway Telegraph Superintendents, 1909-1910, and formerly superintendent of telegraph of the Chicago and Eastern Illinois Railroad, Chicago, is now superintendent of transportation of the New Orleans Great Northern Railroad Company, with headquarters at Bogalusa, La. Mr. Davis also occupies the position of superintendent of transportation of the Great Southern Lumber Company, and is president of the Bogalusa Telephone and Telegraph Company.

Mr. R. L. Logan, superintendent of telegraph of the Kansas City Southern Railway, Kansas City, Mo., has had his authority extended over the Arkansas Western Railway.

Miss Nellie Belle Hope, daughter of the late H. C. Hope, superintendent of telegraph of the Chicago, St. Paul, Minneapolis & Omaha Railway, at Minneapolis, Minn., and well known to railway and telegraph officials throughout the country, will be married to Mr. Parker D. Dix, of Baltimore, on March 18.

Train Dispatching by Telephone.

At the meeting in St. Louis, January 26, of the Western Division of the Association of Railway Telegraph Superintendents, considerable discussion took place on the use of the telephone for dispatching and message service. Mr. W. W. Ryder, general superintendent of telegraph New York Central Lines, west of Buffalo, Chicago, reported the progress of this class of service on the lines represented by him, explaining that of the road mileage, 89 per cent. of the Lake Shore is now dispatched by telephone, 46 per cent. of the Michigan Central, 50 per cent. of the Big Four, 65 per cent. of the Lake Erie and Western, and on the Chicago, Indiana and Southern and some other small lines, where message circuits are also in use, 100 per cent. covers train dispatching and practically that amount for message service. Mr. H. D. Teed, superintendent of telegraph St. Louis and San Francisco Railway, St. Louis, reported that 750 miles of his road was equipped with two physical circuits, one for dispatching and the other for message work, while a phantom circuit is secured from these. Mr. W. C. Walstrum, superintendent of telegraph Norfolk and Western Railway, reported that on 850 miles of his line trains are handled by telephone. One circuit, composed of a No. 8 B. W. G. wire is 707 miles long, and is used for through message purposes.

High Tension Line Crossings.

Mr. Geo. A. Cellar, superintendent of telegraph Pennsylvania Lines west of Pittsburg, has been appointed to represent the Association of Railway Telegraph Superintendents on the joint committee of the National Electric Light Association, the American Railway Engineering and Maintenance of Way Association and the American Electric Railway Association, in the preparation of an overhead crossing specification applicable to aerial crossings of electric power wires over telephone or railway systems. As announced in the February 16 issue of this paper a meeting of the High Tension Committee of the Association of Railway Telegraph Superintendents was held in New York February 7, and on February 8 it met the joint committee referred to and considered the general subject. Considerable progress was made.

Boston Meeting of Railway Telegraph Superintendents.—The entertainment committee of the Association of Railway Telegraph Superintendents is hard at work in preparing for the reception and entertainment of the delegates and friends at the next annual convention of the association which is to be held in Boston, June 19-23. It is proposed to give the meeting a distinctive Turner Monument Fund character by adopting a badge with a representation of the monument on one side and a likeness of Mr. Charles Minot, general superintendent of the Erie Railroad, who sent the first telegraph train order, upon the other side. Mr. S. A. D. Forristall, superintendent of telegraph of the Boston & Maine Railroad, Boston, is the chairman of the committee of arrangements. The convention headquarters will be at the Hotel Brunswick. Additional information can be obtained from the secretary, Mr. P. W. Drew, Minneapolis, St. Paul and Sault Ste. Marie Railway, 204 Clark Street, Chicago.

Trade Notes.

Appointment.—Mr. M. S. Allen, who has been in charge of the telephone sales department of the Western Electric Company's Atlanta, Ga., house for three years, has been appointed manager of the Omaha house of the same company.

Central Battery Telephone Sets and Accessories.—Bulletin No. 1117, describing central battery wall and desk sets, together with their accessories, for meeting standard requirements, has been issued by the Western Electric Company, New York.

Selector Resistances.—The United States Electric Company, New York, has issued in pamphlet form the article printed in these columns January 1, on the "Determination of Selector Resistances," by Mr. W. E. Harkness. The pamphlet is gotten up in an excellent manner, coated paper being used, and the press work is well executed. It is, on the whole, exceedingly neat, and well worth preserving for the valuable information it contains on the subject of selector operation. The full-page chart used with the article has been printed on a long folding sheet which, when opened out, is constantly before the reader for reference. This is a very convenient arrangement. The price of this pamphlet is 25 cents.

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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. It is divided into two sections, viz.: From New York to Bay Roberts, N. F., and from Bay Roberts to Sennen Cove, Penzance, England. The section as laid from Coney Island to Bay Roberts is 1409.75 nautical miles in length, from cable house to cable house. The core is made up of 350 lbs. of copper and 250 lbs. of gutta percha per mile. The conductivity resistance is 3.47 ohms per nautical mile at 75° F. and the inductive capacity is .382 microfarads per nautical mile at 75° F.

The section between Bay Roberts and Sennen Cove, as laid, measures 2036.4 nautical miles, from cable house to cable house. The core consists of 700 lbs. of copper and 360 lbs. of gutta percha per nautical mile. The conductivity resistance is 1.743 ohms per nautical mile at 75° F. and the inductive capacity is .445 microfarads per nautical mile at the same temperature. Total length of cable 3446.15 nautical miles.

Bay Roberts, which is on the eastern coast of New Foundland, was selected as the safest landing place for the cable on the New Foundland shore.

The new cable is the most modern of Atlantic cables as regards construction. The central copper conductor of the section between Bay Roberts and England is the heaviest ever put into an Atlantic cable. It is surrounded by six copper strips laid spirally, as is also the conductor of the New York-Bay Roberts section. The cable was made by the Telegraph Construction and Maintenance Company, of London.

The Turner Monument Fund.

The Turner Monument Fund is rapidly approaching the thousand dollar mark, and when that sum has been collected, one-third of the required amount to complete the work will have been secured. The next meeting of the Association of Railway Telegraph Superintendents, which will be held in Boston June 19-23, will probably take special action on the Turner Monument matter. It is proposed to design a badge for the members which will show on one side a picture of the monument and on the other a portrait of Mr. Charles Minot, general superintendent of the Erie Railroad, who sent the first telegraph train order. This historical event took place at Turner in the autumn of 1851. It has been considered a circumstance of sufficient importance to justify its commemoration in bronze and granite and the Association of Railway Telegraph Superintendents and the Old Time Telegraphers and Historical Association have officially endorsed the movement.

The following named gentlemen constitute the committee in charge of the Monument Fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal,, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

The contributions received up to date are as follows: Previously acknowledged, $941.25.

James Arrigan, Paterson, N. J., $1.00; J. F. O'Connell, Newark, N. J., $.50; P. J. O'Connell, Newark, N. J., $1.00; R. Palmer, Port Jervis, N. Y., $.50; Warren Holt, Paterson, N. J., $.25; C. F. H. Johnson, Passaic, N. J., $2.00; M. Regan, Paterson, N. J., $1.00; J. D. Rahaley, Paterson, N. J., $1.00; G. M. Curren, Paterson, N. J., $1.00; A. Wollenhaupt, Arlington, N. J., $.25; H. G. Reich, Chicago, Ills., $1.00. Through N. E. Smith, New Haven, Conn., supt. of telegraph, N. Y., N. H. & H. R. R.; N. E. Smith, New Haven, Conn., $5.00; H. A. Shepard, New Haven, Conn., $1.00; J. A. Droege, Providence, R. I., $1.00; J. Coburn, Providence, R. I., $1.00; H. P. Haley, Providence, R. I., $1.00; J. A. Carroll, Providence, R. I., $1.00; M. D. Miller, Providence, R. I., $1.00; H. E. Webber, Providence, R. I., $1.00; V. Parvin, Waterbury, Conn., $2.00; G. A. Heller, Waterbury, Conn., $1.00; J. B. Considine, Hartford, Conn., $1.00; G. P. Snow, Taunton, Conn., $2.00; T. P. Wheeler, Walnut, Kansas, $1.00. Mr. O. C. Green, superintendent of telegraph, Northern Pacific R. R., St. Paul, Minn., sends the following: Through Mr. J. E. Cramer, Dilworth, Minn., $3.00, contributed by different parties around General Office Building, Fargo Division; H. H. Maher, Staples, Minn., $1.00; F. L. Birdsall, Staples, Minn., $1.00. Total, $974.25.

Telegraph Dot Transmitter. — Mr. Harry H. Smith of Brooklyn, N. Y., has been granted a patent on a "Telegraphic Dot-Transmitter." The vibrator is actuated by a supplemental lever by means of which the circuit is consecutively opened and closed so that a predetermined number of dots can be automatically transmitted on the line. The dashes are made with the ordinary key to which the invention is attached. The supplemental lever is supported on the pivots of the main lever with the main portion of its length over the said main lever, and the vibrator extends up from the said supplemental lever. In general appearance the device resembles an ordinary key with two levers and two knobs.

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Annual Meeting of the Mackay Companies.

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

Referring to the combination of the American Telephone and Telegraph Company and the Western Union Telegraph Company, President Mackay states that the combination "has not injured the business of the Postal Telegraph-Cable Company—quite the reverse."

Mr. Mackay states that the advantage to the telegraph companies of the night-letter service "is doubtful, to say the least. It necessitates the transmission of fifty words instead of ten, and transmission is expensive."

The employes of the Commercial Cable and Postal Telegraph systems continue to invest their savings very largely in shares of The Mackay Companies, their holdings being over two million dollars par value.

The gross earnings of the land line system have increased substantially during the past year, but increased wages have absorbed a great part of increased earnings.

The profit and loss account for the year February 1, 1910, to February 1, 1911, shows:

Receipts:

	1911.	1910.
Income from investments in other companies	$4,125,907	$3,808,779
Disbursements:		
Dividends paid on The Mackay Companies—		
Preferred shares	2,000,000	2,000,000
Common stock	2,069,020	1,758,667
Operating expenses, etc.	37,194	32,284
Balance carried forward	19,093	17,774

The balance sheet shows:

ASSETS.

	Feb. 1, '11.	Feb. 1, '10.
Investments in other companies	$91,919,338	$92,083,966
Cash	384,521	200,201
Total	$92,303,859	$92,284,166

LIABILITIES.

Preferred shares issued	$50,000,000	$50,000,000
Common shares issued	41,380,400	41,380,400
Surplus	923,459	903,766
Total	$92,303,859	$92,284,166

The trustees were re-elected as follows: Mr. Clarence H. Mackay, Mr. William W. Cook, Mr. George G. Ward, Mr. Edward C. Platt, Mr. Robert A. Smith, Mr. H. Vincent Meredith, Mr. Milton W. Blackmar.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER XLIII.

What apparatus is used in the Wheatstone automatic duplex?

How are the received signals on the Wheatstone apparatus recorded?

What are the principal points of difference between the Wheatstone system and the Morse system?

By what means are messages transmitted by the Wheatstone system?

Describe the operation of the perforator.

How is the tape perforated to distinguish between dots and dashes?

What class of current is used in the operation of the Wheatstone system?

Describe the operation of transmission of a message perforated on the tape.

How is the Wheatstone duplex balanced?

What instrument is used to indicate a balance?

CHAPTER XLIV.

What is the function of a lightning arrester?

What is the effect of a lightning discharge upon a wire?

Why is it more difficult to provide protection on alternating current lines than upon direct current lines?

What is the effect of a coil in an alternating current circuit?

What is an impedance coil?

How is a path to ground usually provided in lightning arresters containing impedance coils?

How is the coil of the Argus lightning arrester wound?

Describe the construction of the Argus lightning arrester?

Where should the arrester be placed with reference to the line to be protected in order to afford the most reliable protection?

CHAPTER XLV.

What are the chief features of the Skirrow switchboard as used by the Postal Telegraph-Cable Company?

Describe the construction of the switchboard and show the points of difference between it and the old style of board.

What is the terminal frame and what advantages does it possess?

What apparatus are the pin jacks connected with?

How are the main line jacks and the pin jacks connected with each other?

What is the annunciator board and how is the annunciator operated?

How are the various lines and connections indicated and identified on the board?

Enumerate the advantages of this switchboard system as a whole.

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Destruction of Poles by Woodpeckers.

In our issue of February 16 we printed extracts from letters written by many railway telegraph superintendents and others interested in the subject of telegraph pole lines and their maintenance but for the lack of space we could not print all that had been received. The remainder, therefore, are given herewith:

Mr. J. L. Henritzy, superintendent of telegraph, Colorado & Southern Railway, Denver, Col.: "Woodpeckers burrow into our poles extensively throughout Texas, and on the 400 miles of line we lose an average of five poles per year. Many pecked poles are of course standing, and we do not replace them unless they are broken by winds. This insectivorous bird is an indefatigable worker, and we have not taken any pains to discourage him, considering it futile."

Mr. M. H. Clapp, division plant superintendent, Western Union Telegraph Company, Chicago: "It has been my experience that the damage done to poles by woodpeckers does not amount to as much as is generally supposed. In the first place, woodpecker holes do not weaken the poles as much as was considered at one time. I know this to be true from actual breaking tests of poles on which there were what was regarded as very bad woodpecker holes. There are, without doubt, instances where woodpecker holes have weakened poles considerably, but this I believe is only true in a small percentage of the cases. Regarding the principal causes of destruction of poles on our system, I would say briefly that ordinary decay or rot at the ground line affects the greater number of the poles that it is necessary to replace. We also lose a considerable number of poles from burning off at the ground line, and from other causes, such as being shattered by lightning, etc. However, ordinary decay and depreciation of poles is the principal cause that we are continually thinking about and planning to prevent in any way possible."

Mr. J. W. Lee, Jr., of the Pennsylvania Railroad Company, Philadelphia: "I beg to advise that we have found that the damage done by woodpeckers is usually confined to cedar poles, though we doubt very much if the birds are responsible for the direct destruction of many poles. Creosote is a substance in which neither animal nor vegetable life can exist. It is possible, however, that a woodpecker might drill a hole through an inch or two of creosoted wood on the outside of a pole to provide a nesting place in the untreated heart."

Mr. J. J. Lynch, superintendent of construction, Postal Telegraph-Cable Company, San Francisco: "During my experience while located at Kansas City, I found that poles were damaged a great deal by woodpeckers and that this damage was in most cases to poles that had insects of some kind in them. This company's line was damaged to such an extent between St. Joseph and Leavenworth, a distance of forty miles, that it was necessary to rebuild it long before its time. The line in eastern Kansas, and all of Missouri, and a portion of Illinois, along the Mississippi river appeared to be bothered by woodpeckers more than any other part. This company's line between Kansas City and St. Louis was damaged considerably, but not as much as the line mentioned. The only preventive I ever used was wire netting, which proved satisfactory as long as it lasted, but in a great many instances it rusted out very soon. In one case where the holes in a pole filled with young woodpeckers had been covered up with wire netting the mother cut the netting and thus reached her young while the men were at lunch. I have not noticed any great amount of damage to our poles on the coast from woodpeckers. There is some, but it is trifling. The principal cause of the destruction of poles is the rot at the ground, which varies with the soil. I have never used any of the chemical processes for preserving poles, and do not know that it pays to do so, unless put in under pressure, judging from what treated poles I have seen."

Mr. C. T. Day, superintendent of telegraph, Ferrocarril sud-Pacifico de Mexico, Empalme, Sonora, Mexico: "Our burnettized poles, although fine and well preserved, are going the same way that the creosoted ones are. They were set last May but birds have begun to peck at them. Am now trying cement where we find the birds have started. The new holes will be plastered up with it. This treatment will have a tendency to preserve the pole."

Mr. J. B. Sheldon, superintendent of telegraph, Union Pacific Railroad Company, Omaha, Neb.: "We do not seem to be having any serious trouble on account of woodpeckers at the present time, although we have at times had damage done to cable boxes, and I recollect one instance where a telegraph pole was very badly damaged. Our troubles all together in this way have been so few and far between, however, that it hardly seems necessary for us to take any special action to guard against such damage."

Mr. L. M. Jones, superintendent of telegraph, Atchison, Topeka and Santa Fe Railway, Topeka, Kan.: "Mr. George Denison's reference in your issue of February 16 to loss of poles between Los Angeles and Albuquerque, due to damage by woodpeckers is correct. There are very few woodpeckers along our line in that section, in fact, very few birds of any kind are found in this part of the country. The phantoplex referred to in the same article is operated by the Postal Telegraph-Cable Company, whose line parallels ours from Albuquerque to Los Angeles."

Mr. I. T. Dyer, superintendent of telegraph, San Pedro, Los Angeles and Salt Lake Railroad Company, Los Angeles, Cal.: "We do not seem to be afflicted with the woodpecker pest which is so prevalent in other parts of the country. As a matter of fact we find very little or no damage to telegraph poles by insects or vermin of any kind."

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The woodpecker has a friend in Mr. Charles H. Lane, superintendent of construction of the Postal Telegraph-Cable Company, who writes: "I am a great lover of birds, woodpeckers included, and wouldn't think of doing anything to deprive even a woodpecker of the necessaries of life, and you know how the cost of living has advanced. We simply let the poor woodpecker peck."

Death of Isaac McMichael.

Isaac McMichael, vice-president and general manager of the Great North-Western Telegraph Company, Toronto, Ont., died at the Johns Hopkins Hospital in Baltimore, on February 22. Mr. McMichael entered the hospital on February 6 suffering from an acute form of dilation of the heart and was operated upon shortly after. At first the operation, which was a delicate one, seemed to relieve the tension around the organ, but later the old trouble returned, and a second operation was deemed necessary. Every effort was made to restore the patient to a condition to withstand the operation, but he was unable to respond to treatment and died.

Mr. McMichael was born in Brantford, Ont., January 7, 1840. He began his telegraphic career in 1856 in Canada and came to the United States in 1860, locating at Piqua, Ohio. He entered the United States military telegraph service at the outbreak of the civil war and saw considerable field duty. At the close of the war he entered the service of the Western Union Company at Kansas City. He was appointed chief operator at St. Louis in 1869, and in 1870 became chief clerk to Col. Robert C. Clowry, who at that time was superintendent of the Western Union Telegraph Company at that point. In 1874 Mr. McMichael was appointed assistant superintendent, which position he held for seven years. On July 1, 1881, he was advanced to the superintendency of the newly created district of the Western Union Company, with headquarters in Minneapolis, Minn. He held this position for twenty-two years, and upon the retirement of Mr. H. P. Dwight from the general management of the Great North Western Telegraph Company, Toronto, Ont., he was, in October, 1903, elected vice-president and general manager. Mr. McMichael was an intelligent, progressive and able manager, and had a host of friends who will mourn his loss.

He is survived by his wife, a daughter and a son, Mr. S. B. McMichael, who is assistant general manager of the Great North-Western Telegraph Company at Toronto.

Obituary.

James Elverson, editor and proprietor of the Philadelphia Inquirer, and an old-time operator, died in that city February 10. Mr. Elverson was born in England in 1838 and came to this country with his parents in 1847. At the age of fourteen he entered the office of the Magnetic Telegraph Company in Newark, N. J., as messenger, and became an operator two years afterward. Later he became manager of the consolidated offices, being at the same time agent for the Associated Press. Subsequently he assisted in line construction throughout New Jersey. During the Civil War he held a position in Washington with the American Telegraph Company, but retired from telegraphy in 1865 to take up newspaper work to which he devoted the rest of his life.

Municipal Electricians.

Recent Patents.—Among the patents issued February 7 on fire alarm and kindred apparatus are the following: No. 983,306, Automatic Fire Alarm, to E. F. Oliver, Monroe, Ind.; No. 983,345, Thermostat, to J. Bockel, Philadelphia, Pa.; No. 983,443, Electrical Alarm Thermometer, to R. Heddle, Nelson, B. C., Canada; No. 983,713, Fire Alarm, to S. J. Heinrich, Bellevue, Pa.

Patent No. 511,462 for a fire alarm telegraph issued to Charles H. Rudd, Chicago, has expired.

Stockton's Fire Alarm System Criticised.—An unreliable fire alarm system is one of the weak points of the fire fighting facilities of Stockton, Cal., according to the engineers of the National Board of Fire Underwriters. It is an automatic system maintained by an electrical contractor under the direction of the fire chief, and has no registering devices. The wires are on poles with high-tension circuits at many points; tests are irregular and no records are kept.

The Sonorophone.—Mr. John F. Kelly, Jr., chief of the Electric Bureau of Camden, N. J., is the inventor of an electrical musical instrument, which was exhibited in practical operation, at the Philadelphia Electrical Show last month. Mr. Kelly has discovered a means by which the music of a talking machine may be transmitted to a distant point either by wire or by wireless. The machine is fitted with a telephone transmitter in place of the usual horn and the music is thus transmitted to a distant room, the received electrical notes being amplified by means of a horn. The instrument was the centre of attraction at the show.

Municipal Electricians' Convention. — Active preparations are going forward for the next convention of the International Association of Municipal Electricians which is to be held in St. Paul, Minn., in September. The place and time of the meeting are wise selections and as fire matters in the Twin Cities are, in keeping with the spirit of those communities, held up to the top notch of efficiency, the visiting electricians will find much of interest. The meetings of the municipal electricians result indirectly in greater security from fire to the people of the country at large on account of the advanced knowledge obtained by the members of the latest ideas and appliances. The dates of the meeting have not yet been fixed, but the announcement will soon be made by the executive committee. Mr. Clarence R. George, city electrician, Houston, Tex., is secretary of the association.

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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.]

(18) Q. I desire to find the value of current in a circuit with a resistance of 500 ohms and an e.m.f. of 250 volts. I have applied Ohm's law to this problem and get .5 milliamperes, but I know that this answer is wrong. Will you please point out my error? W.

A. Your error is due to the confusion of terms. You call the result .5 milliamperes when it really is .5 ampere. According to Ohm's law 250 ÷ 500 = .5 ampere, not .5 milliampere. A milliampere is equal to one one-thousandth of an ampere, therefore, .5 ampere expressed in milliamperes is .005. The answer is five milliamperes, not five-tenths of a milliampere.

(19) Q. What is the meaning of the word hysteresis, used in connection with the magnetization of masses of iron? T. M. O.

A. Magnetization of the core of a field magnet for instance, involves the rearrangement of the position of the molecules of the iron. If it then be magnetized in the reverse direction another rearrangement of the molecules takes place. With a rapidly alternating magnetizing force the molecules of the iron are in a state of continual motion. One effect of this action is that the motion of the particles of iron lags behind the magnetizing force. To this lagging effect the name hysteresis has been given.

(20) Q. Please explain the meaning of the word "frequency" which I often notice used in connection with alternators, and give the rule to ascertain the frequency. F. R.

A. Each conductor in the armature cuts across the lines of force from each pole as many times in a revolution as there are poles. The time in seconds required for any point on the circumference of the armature to pass two poles is called its "period" and the number of these periods per second is called the "frequency." The rule to find the frequency of an alternator is: Multiply the number of revolutions per second by half the number of the poles of the machine.

(21) Q. I have a large permanent magnet which seems to be losing its magnetism. Can you give the reason for this? A. P. M.

A. Permanent magnets lose their magnetism if they are roughly handled or knocked about. A sharp tap with a hammer will frequently destroy the magnetism. Magnetism is also lost by heating the magnet to a bright red. A slight vibration will destroy residual magnetism in annealed soft iron. All permanent magnets lose their magnetism gradually but shocks hasten the decay.

(22) Q. Does the size of the positive and negative plates in a cell of primary battery have anything to do with the electromotive force of the cell? F. O. T.

A. No, it does not. The size of the plates can be increased or decreased, or the plates may be placed closer together or wider apart, but that will not affect the electromotive force. The e.m.f. of a call depends entirely upon the nature of the materials used for the electrodes.

(23) Q. What is the meaning of the word "conductance" as applied to electric wires? R. E. S.

A. The word conductance means the relative conductivity of a wire and is expressed as being the reciprocal of the resistance of the wire. Thus, suppose we have a wire with a resistance of 750 ohms, its conductivity (conductance) would be written 1/750.

(24) Q. What is the meaning of the term permeability? D. E.

A. If a bar of iron be placed inside a helix through which a current of electricity is flowing, the number of lines of force produced is greatly increased. This power of iron to concentrate the lines of force is called its permeability. Permeability, however, is affected by the presence of impurities in the iron, such as phosphorus, carbon, etc.

Improved System of Telegraphy.—Mr. Robert L. Dean, of Chicago, has obtained a patent on a system of telegraphy. Positive and negative impulses transmitted from batteries of opposite polarity are employed in the transmission of messages, the impulses being controlled through the aid of embossed message-sheets and contact devices which latter are drawn to and fro over the successive rows of embossments upon the message-sheets.

Claim 15 reads: In a system of telegraphy, character-bearing levers arranged to travel to and fro, electrically-controlled means for actuating said levers, a relay in circuit with said means to control the same, contact-levers in circuit with said relay to control the same and arranged to travel to and fro, a sheet containing embossments for actuating said contact-levers one at a time to temporarily close the circuit in which they are arranged, and means for simultaneously starting the character-bearing levers and the contact-levers on their to and fro movements.

The Turin Exposition and Telegraph Tournament.

The Turin International Exposition of Industry and Labor will be opened on April 29 by the King and Queen of Italy. The exposition is to celebrate the fiftieth anniversary of the declaration by the First National Assembly, in Turin in 1861, that Victor Emanuel II was the first King of Italy. During the exposition an international telegraphic tournament will be held, in which event much interest is manifested by European governments. Details of the tournament were published in these columns, July 1, 1910, and January 16, of this year.

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Commercial Association of the Western Union Telegraph Company.

The Greater New York Commercial Association of the Western Union Telegraph Company was organized a few evenings ago after an informal dinner at the Hotel Gonfarone. The following officers were elected to serve one year: President, Mr. P. J. Casey; Vice-President, Mr. M. E. Pierce; Secretary, Mr. John Simmonds; Treasurer, Mr. Thomas F. Hull. Board of Governors: Chairman, Mr. John Veitch; Mr. M. J. Hayden; Mr. Albert Lister; Mr. Frank Spree; Mr. James J. Riley. Honorary Members: Mr. James F. Nathan and Mr. Maynard W. Hamblin.

Mr. James F. Nathan, district commercial superintendent, addressed the assemblage and in a very forcible manner outlined the purpose of the new organization, viz.: to promote the welfare of the employes, introduce modern supervision in every branch of the telegraph organization, provide comfortable offices for employes, whether he be messenger or official, popularize the service by raising the standard of efficiency, and to recognize the merit of each individual and measure his work by merit earned.

Mr. John Simmonds spoke of the requisites essential to qualify the representatives of the company to meet the general public, and the support and co-operation of the telegraph organization necessary to redeem the assurance of the "field men;" that every detail of the service must be carefully supervised to obtain satisfactory results, placing the company's service above criticism.

Mr. P. J. Casey, the dean of the service in the executive branches in New York City, delivered a very witty and characteristic address embracing the telegraph service from its infancy and the vast increased facilities established in the upper section of the city to meet the requirements of the public.

Mr. Albert Lister, Mr. Thomas P. Hull, Mr. C. B. McCann, Mr. P. J. McMahon, Mr. J. J. Riley, Mr. F. W. White, Mr. M. J. Hayden, Mr. John T. Carberry, Mr. Frank Spree and many others identified with the service spoke briefly of the benefits that the telegraph fraternity in Greater New York will derive as a result of the new organization, which will meet on the first Monday of each month at the Hotel Gonfarone.

New Atlanta Western Union Office.

The Western Union Telegraph Company moved into its new quarters in Atlanta, Ga., on January 28. The office is in the new building of the Atlanta Journal on North Forsyth Street, the operating room being located on the fifth floor of the structure.

The office is equipped with new machinery and apparatus, very little of the old material from the former office being utilized. All of the desks are new, and ample lockers have been provided for the operators and other employes; also two shower baths with hot and cold water. A new five-section fifty-wire switchboard was installed, and the electric generators are placed on a concrete foundation to avoid vibration.

The office has a high ceiling and is well ventilated. It receives daylight from three sides, and at night is lighted by electric lights placed sufficiently high to throw ample light over the entire room. Altogether it is well arranged for the handling of business and for the convenience of the operators.

The old office was occupied by the company for twenty-two years. Gravity batteries were used at first; these were afterward displaced by storage batteries and they, in turn, gave way to generators more than ten years ago.

The operating force at Atlanta consists of 140 operators. The officials of the company are located on the second floor of the building and their offices are handsomely furnished. Mr. H. C. Worthen is general superintendent, Mr. J. M. Stephens, division commercial superintendent; Mr. D. M. Therrell, division traffic superintendent and Mr. L. H. Beck, division plant superintendent. The district superintendents are: Commercial, Mr. E. E. Williams; Traffic, Mr. G. W. Lloyd; Plant, Mr. W. A. Neill. Mr. S. L. Burts is manager and H. K. Griffin, chief operator.

Atlantic City Meeting of Old Timers.—The Atlantic City meeting of the Old Time Telegraphers and Historical Association, and the Society of the United States Military Telegraph Corps, on September 5, 6 and 7, promises to be one of the most enjoyable and largely attended meetings ever held by the twin organizations. It would be very difficult indeed to find a more delightful spot than Atlantic City at that season of the year. Plans for the meeting are being developed and announcement will be made to the members of anything of interest. The headquarters will be at the Marlborough-Blenheim. Col. W. B. Wilson, Holmesburg, Pa., is president of both associations, and Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old Time Telegraphers and Historical Association. Mr. David Homer Bates, 658 Broadway, is secretary of the Society of the United States Military Telegraph Corps. Mr. G. W. Deetz, manager of the Western Union Telegraph Company, Atlantic City, N. J., is a member of the executive committee and has charge of many of the arrangements.

An American Consul in Amazonia.—Major J. Orton Kerbey, an old time telegrapher, formerly United States Consul to Brazil, and author of "The Boy Spy" and other books, makes an advance announcement of a new work entitled "An American Consul in Amazonia." It is a narrative of the author's experience in Brazil several years ago. It touches on the rubber industry, railways, climate, and the life of the people in the Amazon country. The book is now in the hands of the publishers and will be sold by subscription at $2.50 per copy.

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Effect of Sending Machines Upon Quadruplexes.

Under this title we printed an article in these columns February 16 by Mr. J. P. O'Donohue, division electrical engineer of the Postal Telegraph-Cable Company, describing the effects upon the second side of a quadruplex of the mechanical transmission of dots at various speeds.

Mr. Stephen D. Field, the well-known electrical inventor and old-time telegrapher, of Stockbridge, Mass., suggests that the situation can be met by prohibiting a greater speed than five dots per second, which is equivalent to forty words per minute, and that any machine making dots at a higher rate of speed should not be allowed on a circuit. All transmitting machines, he states, could be made so as to not exceed this limit, thus standardizing the instrument. Any one could tell by means of a watch whether these instruments were standardized and meeting the requirements.

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LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

Joseph Knittle, a well-known old-timer, formerly of this office, who worked on the old printer system, died February 10 at his home in Brooklyn. Mr. Knittle was born in Rochester, N. Y., September 10, 1839. He entered the telegraph service in 1852 as a messenger in New York and remained in that city all through his business career except between 1864 and 1866, when he was an operator in the United States Military Telegraph Corps, and located in the south. On his return to New York in 1866 he entered the printer service of the Western Union Company. Mr. Knittle possessed a gentle character and was highly esteemed by a large circle of friends.

Mr. Michael H. Crane, for several years president of Onnolee Lodge, Order of Iroquois, was presented with a handsome diamond badge, February 8, by the members of that body in recognition of his faithful services during his incumbency.

Mr. Daniel T. Sheridan has returned to his desk fully restored to health after an illness of several months.

NEW YORK, POSTAL.

Mr. E. A. Coney has been appointed night manager to succeed Mr. C. J. McCarthy, who, at his own request has resumed his former duties as assistant night manager. Mr. J. T. Ewing has been transferred from the Western to the Eastern switchboard and Mr. A. Ward from the Eastern to the Western board. Mr. T. P. Smith, assistant all-night chief, has been transferred to the automatic department.

PHILADELPHIA, POSTAL.

General superintendent of plant Mr. W. I. Capen was a recent visitor at this office.

Mr. W. P. Bower, night traffic chief, has been confined to his home for the past month with a severe attack of grippe.

Wire chief Mr. M. A. Baker has been seriously ill with pleuro-pneumonia for the past three weeks, but is now convalescent.

Mr. F. S. Barrett was also among the absentees on account of illness, but has returned to duty.

ST. LOUIS, AMERICAN TELEPHONE AND TELEGRAPH.

Mr. Arthur Koch, late chief clerk to the district plant chief, has been appointed chief test board man at Little Rock, Ark.

Mr. John C. Fallinger has been appointed operator in the office of the district supervisor of leased wire service, Star Building.

Mr. C. W. Erickson, lately with the Missouri Pacific Railway, has accepted a position in the test room.

WANTED.—Live agents in all large Western Union and Postal offices. Central Typewriter Exchange, New York.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, enables telegraph and telephone employes to provide for their families life insurance in reasonable amounts, at a cost so low as to be within the reach of all. It has already paid beneficiaries of deceased members $1,500,000, at an average annual cost per $1,000 of about four cents a day, and has also accumulated $327,000 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.

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J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

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Telegraph and Telephone Age

No. 6. NEW YORK, MARCH 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY—XIV.

BY WILLIS H. JONES.

QUESTION AND ANSWER.

Question.—Is there any difference between the current-creating power of a positive and a negative electromotive force of equal pressures? If not, why do we sometimes get different indications when one polarity is substituted for the other, especially when using a galvanometer?

Answer.—No, there is no difference in their pressure under normal conditions of the conductor being measured, that is to say, where there are no foreign electrical influences affecting the circuit.

This can be readily proved by causing a current to flow through the coils of a rheostat alternately from a positive and a negative battery of the same e. m. f. The current will be exactly the same value in either case.

If, however, there is a foreign electric influence in the conductor, there will obviously be a greater pressure in the line with one polarity than the other, because the foreign pressure has a polarity of its own. If the polarity is positive it adds its e. m. f. to our negative pole, and, *vice versa*, it opposes our positive battery.

The difference in the volume of current that an ammeter shows when we shift from say 100 volts positive to 100 volts negative under these conditions is not due to any inequality in our battery but to alternately helpful and opposing conditions existing in the external conductor.

Nevertheless, while there is really no difference in the current creating abilities of the two polarities under normal conditions, a positive battery can actually create a different condition in a slightly defective conductor, if given time, which condition is the opposite in character to that which a negative battery would cause. This phenomenon, no doubt, has misled some to doubt the initial equality of the two polarities.

The explanation of their different behavior in defective circuits is this: Where a slight defect in a conductor exists, such, for example, as a partial break or rusty thin strand in a poorly insulated cable, a positive current if given time will precipitate a thin metallic film of sulphate of zinc over the joint. This tends to bridge the fault as well as reduce the resistance of the circuit.

On the contrary, a negative current if substituted for positive will soon remove such film and leave the joint bare and bright. This fact may be readily proved with an ordinary 150-ohm relay. Connect a positive battery to the faulty cable and pull up on the spring until the relay points just stand open. In a few minutes the relay will close. Then pull up again. The relay will again soon close as before. This operation may be repeated, in some cases, many times. Each closing of the relay indicates that the volume of current is gradually increasing and this proves that the joint is healing.

Now if you substitute a negative current, the opposite effect will be caused.

Turn down the retractile spring till the relay points just close and wait. In a few minutes the relay will open. Turn down again and wait. It will continue to open soon after each readjustment until the joint is bare and bright, after which the volume of current will remain practically unchanged.

Nor does the fact that a positive current will create marks on a blue litmus stained tape while negative will not, indicate any actual difference in the strength of positive and negative currents. This phenomenon is due to the difference in direction in the flow of current, the marks being the result of the separation of the molecules comprising the solution through the action of the current which flows through it. That portion of the solution which forms the coloring matter simply happens to seek the positive electrode and consequently appears on the top or surface of the tape. It rarely shows through on the under side unless the tape is very thin and strongly saturated. When it does the mark is usually very dim and probably due to the transparency of the paper ribbon.

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When it comes to the question of creating magnetic lines of force in an iron magnet there is, again, no difference in the number developed by equal electromotive forces of different polarity. It has been claimed, by an authority, that a negative force begins to act a little sooner than the positive, but even if this is true the advance is so slight that the effect is inappreciable in the practical operation of any apparatus used in the telegraph or telephone service. So the question may be disregarded, as being a matter of no importance to us. Possibly there is nothing behind the statement to warrant the claim.

A careless experimenter might be easily deceived if he overlooked the fact that even the best of soft iron often retains a little residual magnetism after having been charged by an electric current.

It is obvious that if such a magnet be recharged with the same polarity of current as it received on the previous charge it will begin to act slightly quicker than it would if the second charge was of opposite polarity, for the reason that in the latter case the first part of the charge would have to clean out the opposing residual magnetism in the iron before beginning to build up the new lines of force.

Had the residual magnetism been of a polarity like that of the recharging current it is evident that the process of rebuilding would begin at once and be completed in shorter time.

Recent Telegraph and Telephone Patents.

ISSUED FEBRUARY 21.

984,547. Central Energy Telephone System. To F. W. Dunbar, Chicago, Ill.

984,558. Mouthpiece for Sound Transmitters. To J. Graham, Philadelphia, Pa.

984,679. Automatic Adjustable Holder for Telephone Receivers. To S. O. Lancaster, London, Ont., Can.

984,686. Intercommunicating Telephone System. To R. H. Manson, Elyria, Ohio.

984,738. Anti-Induction Apparatus for Telephone Systems. To A. Barrett and W. Condon, Kansas City, Mo.

984,945. Telephone System. To O. M. Leich, Genoa, Ill.

984,958. Telephone Exchange System. To J. G. Mitchell, Cleveland, Ohio.

984,154. Electrical Signaling and Alarm Apparatus. To C. H. Pool. New York.

984,210. Sprinkler Alarm System. To A. Goldstein and H. F. Blackwell, New York.

984,211. Electrical Alarm System. To A. Goldstein, New York.

The following patents have expired:

514,695. Telephone. Issued to C. T. Bloomer, New York.

514,823. Telephone Signaling System. Issued to Webster Gillette, New York.

514,913. Cushion for Telephone Receivers. Issued to V. A. Cook, Averill Park, N. Y.

514,916. Telephone. Issued to D. Drawbaugh, Eberly's Mill, Pa.

514,920. Telephone Transmitter. Issued to P. Fitzsimons, Birmingham, Ala.

515,531. Switch and Circuit for Telephone Exchanges. Issued to J. J. O'Connell, Chicago, Ill.

515,709. Telegraphic Instructor. Issued to T. J. Houck and H. M. Browning, Baltimore, Md.

Personal.

Col. R. C. Clowry and Mr. F. J. Scherrer, his secretary, have returned to New York from Palm Beach, Fla., where they spent several weeks.

Mr. John Darr, assistant superintendent of telegraph for the Standard Oil Company, Oil City, Pa., was a recent New York visitor.

Mr. W. W. Splane, former superintendent of telegraph for the Standard Oil Company, and now in the oil producing business, with headquarters at Oil City, Pa., was also in New York recently.

Dr. Karl George Frank, of New York, representative of the Siemens & Halske Company, of Berlin, Germany, will sail for Europe about April 1, on business. He will be absent about four months.

Mr. W. J. Mercer of London, England, director of the Commercial Telegram Bureau, is making a business visit to New York and took occasion to call upon many old friends in the telegraph and cable service.

Mr. and Mrs. Thomas A. Edison celebrated the silver anniversary of their wedding February 24 with a quiet family dinner at their home. Mr. Edison, however, managed to get in a good day of hard work in his laboratory.

Mr. J. A. Hulit, formerly of Topeka, Kan., a well known telegrapher and electrical expert and the inventor of the Hulit transmitter, is now in the service of the Western Electric Company at New York having recently been transferred to this city from its Chicago office.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, Mr. W. I. Capen, general superintendent of plant, and Mr. Lewis MacConnach, secretary, are again at their desks after an absence of several weeks in the far west and south in the interest of the service.

Mr. V. V. Stevenson, division electrical engineer, of San Francisco, is in New York on company business.

Mr. M. N. Redding, traffic chief at Philadelphia, was a recent New York visitor.

Superintendent A. L. Edgecomb, of Boston, has gone to Southern Pines, N. C., for the benefit of his health and expects to resume full duty at Boston within a few weeks. Mr. Edgecomb has been suffering from nervous prostration since last July, but his friends will be glad to learn that he has now fully recovered.

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Signs of new design are being painted on the principal windows on the main floor of this company's building at 253 Broadway, New York. One shows a facsimile of a message on one of the new message blanks and the others represent the company's trade-mark.

Mr. Louis J. Mackey, former manager of the Franklin, Pa., office and who was recently appointed chief clerk to Mr. H. Scrivens, district superintendent at Pittsburg, Pa., was tendered a dinner on February 18 by twenty-two of Franklin's representative citizens on his departure from that city. He was presented with a handsome gold watch as a testimonial of the regard and esteem with which he was held by the citizens of Franklin.

A branch office has been opened by this company in the Marlborough-Blenheim Hotel at Atlantic City, N. J.

The receiving department of the main office at Boston, Mass., will be refitted and enlarged. The plan contemplates making it one of the handsomest offices in the country.

Mr. C. R. Snyder, operator in the Altoona, Pa., office has been transferred to Franklin, Pa., as manager to succeed Mr. L. J. Mackey, whose appointment as chief clerk to Mr. H. Scrivens, district superintendent at Pittsburg, Pa., as noted in these columns March 1.

Mr. T. P. Wheeler, whose resignation as night chief operator at St. Louis, Mo., was announced March 1, was born in Huron County, Ohio, December 25, 1847, and entered the telegraph service at Norwalk, Ohio, in 1863. He has held positions in various places throughout the country and was night chief operator at St. Louis from May 1, 1884, until March 1 of the present year, when he resigned on account of ill health. Mr. Wheeler is now living in retirement at Walnut, Kan.

Telegraph Men at the Opera.—Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Company, New York, entertained several members of the staff of that company and of the Commercial Cable Company, at the first performance of the new American opera, "Natoma," at the Metropolitan Opera House, New York, February 28. Among the guests of Mr. Mackay were Mr. C. C. Adams, second vice-president, Postal Telegraph-Cable Company, and wife; Mr. C. P. Bruch, third vice-president, and wife; Mr. E. C. Platt, treasurer, and wife; Mrs. Nally, wife of Mr. E. J. Nally, vice-president and general manager, and Miss Leslie Foster; Mr. E. B. Pillsbury, general superintendent and Mr. M. M. Davis, electrical engineer.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general manager of the company, has returned to his office after an extended western and southern business trip. The returning party was made up of W. N. Fashbaugh, traffic engineer, S. B. Haig, assistant traffic engineer, and W. C. Merly, secretary, in addition to the general manager.

Mr. Thos. F. Clark, vice-president of the company, accompanied by his wife, sailed for England on February 4 on business connected with the service.

Mr. S. B. Haig, of the traffic department, New York, has returned to his office after visiting southern division offices.

Mr. Thomas W. Carroll, assistant to the general manager, is making an extensive trip of inspection. He recently visited Canada in the interest of the service.

Mr. Henry D. Estabrook, formerly solicitor of this company, on March 1 became a member of the law firm of Noble, Jackson and Hubbard, 52 William Street, New York. The firm name will henceforth be Noble, Jackson, Estabrook and Hubbard. Mr. Estabrook is, however, retained by the Western Union Telegraph Company for special service.

The Western Union stock transfers are now made by the treasurer of the company instead of by the secretary as formerly.

Mr. H. C. Worthen, general superintendent of the Southern Division, Atlanta, Ga., entertained Mr. S. B. Haig, of the traffic engineer's office, New York, and Mrs. Haig, at the Mechanical and Manufacturers' Club, Atlanta, Ga., on February 10.

Mr. Astley C. Terry, of the American Telephone and Telegraph Company, Philadelphia, for many years identified with the same service at Pittsburg, Pa., has been appointed district commercial superintendent of the Third District, with headquarters at Pittsburg, Pa., vice Mr. N. E. Church appointed commercial superintendent at Pittsburg. Mr. Terry is a well-known old-time telegrapher and was for many years in the Western Union service at Buffalo, N. Y. His advancement in late years has been progressive, his honors having been achieved on merit alone.

Mr. W. A. McAllister, of the operating department, main office, New York, has been appointed traffic superintendent of the Central Cable Office, 16 Broad Street, New York.

The Salt Lake City office will be moved into larger quarters in the Tribune building. The furniture will be in Flemish oak and the decorations will be artistically carried out. Free instruction in telegraphy will be given the messenger boys.

The postponed dinner of the Morse Electric Club of New York will take place Thursday, April 6, at the Hotel Savoy.

Mr. Henry K. Griffin, chief operator of the Western Union Telegraph Company at Atlanta, Ga., was born in Bedford, N. Y., December 22, 1864, and entered the telegraph service in that place in June, 1881. He has held positions as operator and manager for the Western Union Company at Ridgefield, Conn., and manager of

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the Postal Telegraph-Cable Company's office at Bridgeport, Conn. Coming to New York for the Western Union, first as operator, he advanced through the positions of assistant quadruplex chief, traffic chief and chief in charge of the quadruplex department, nights. He has filled his present position since December 31 last.

Mr. Harry J. Carpenter has been appointed district traffic superintendent for the Western Union Telegraph Company, with headquarters at Nashville, Tenn. Mr. Carpenter was born at Cohoes, N. Y., November 8, 1867, and entered the telegraph service as messenger in his native town in 1880. He has held positions at Albany, N. Y., Haverhill, Mass., Charleston, S. C., and Charlotte, N. C. On October 8, 1910, he was appointed district traffic chief for western North Carolina, but, on the discontinuance of the traffic force, on February 1 of this year, he was appointed chief operator at Charlotte, N. C., which position he held at the time of his recent appointment.

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.

B. S. Jones, District Commercial Manager Western Union Telegraph Company, Seattle, Wash.

Mr. Branch S. Jones, recently appointed district commercial manager for the second district, Pacific Division, of the Western Union Telegraph Company, with headquarters at Seattle, Wash., was born in Henderson County, Ill., November 14, 1872. He entered the service of the

BRANCH S. JONES.
District Commercial Manager, Seattle, Wash.

Western Union Telegraph Company as messenger in 1888 at Marshalltown, Iowa, and was employed at that point in various capacities until 1904, when he went to the Pacific Coast. He was manager successively at Tucson, Ariz., Sacramento, Cal., Goldfield, Nev., and Spokane, Wash., from which latter position he was advanced to his present post.

G. W. Deetz, Manager Western Union Telegraph Company, Atlantic City, N. J.

Mr. George W. Deetz, manager of the Western Union Telegraph Company at Atlantic City, N. J., it is expected will render valuable assistance in the preparations for the convention of the Old-Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, which is to be held at

GEORGE W. DEETZ.
Manager Western Union Telegraph Company, Atlantic City, N. J.

that famous resort on September 5, 6 and 7. Mr. Deetz is a member of the executive committee of the Old-Time Telegraphers and Historical Association. He is a native of Philadelphia, where he was born on November 29, 1867. He began his telegraphic career in Philadelphia in 1882 as messenger, and advanced through various positions until 1887, when he became manager of the office at the Broad Street station. In 1892, at the age of twenty-five, he was appointed manager of the Camden, N. J., office, which position he held for eleven years, when he was transferred to the Atlantic City office as manager. Mr. Deetz will not leave anything undone that will contribute in the slightest degree to the enjoyment of the members of the two organizations and their families who will attend the convention.

Keep posted on the latest developments in Telegraphy and Telephony by subscribing for Telegraph and Telephone Age.

Mr. F. E. Howell, manager of the Western Union Telegraph Company at Utica, N. Y., writes: "I believe the Telegraph and Telephone Age to be the best paper in its line that I have ever known. It affords me many hours of solid pleasure."

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Mrs. D. M. Tillotson Retired on Pension.

Mrs. D. M. Tillotson, of the Chicago office of the Western Union Telegraph Company, has, after a long and faithful service, been retired on a pension. Mrs. Tillotson is a native of New York State and was the first female operator employed

MRS. D. M. TILLOTSON OF CHICAGO.

in the Chicago office. She never used the typewriter, but could handle sixty messages an hour, this having been proved on test eight years ago.

Mrs. Tillotson's retirement took effect February 15 after a service of fifty years. She has a large circle of friends in and out of the profession who will agree that she has earned a well-deserved rest from her long labors.

The Cable.

Atlantic Cable Recovered.—The Commercial Cable Company's repair ship "Mackay-Bennett," during the year 1910, picked up from the bottom of the Atlantic Ocean 422 miles of transatlantic cable, which the company discontinued using in 1909, when new cables were laid. The picked up cable will be used to advantage elsewhere.

Life at a Cable Station.—It is not generally realized that a cable station at an important point is a village in itself. At the Waterville, Ireland, station of the Commercial Cable Company there are thirty-nine family houses; three buildings containing single men's apartments; operating department and office building; club house; recreation hall with a stage for amateur performances; school for employes' children; two water towers, an electric lighting system, a fire engine and a fire brigade organized from the staff.

Landing Submarine Cables.—In laying the new telegraph cable between Newbiggin, England, and Arendal, Norway, a novel process was adopted in landing the shore end. The usual method of the British postoffice service is to raft the cable ashore, but in the case of this new cable a hauling rope was brought ashore on a raft and passed through a sheave or pulley secured to a wooden frame buried in the sand. It was then carried through a second sheave, placed about 150 yards from the first, and thence back to the ship. In this way the coming and going portions of the rope were kept apart, and as one end was drawn into the ship by the engines, the other end, to which the cable was attached, was pulled ashore. As the cable passed from the ship to the water it was lashed to empty barrels placed at suitable intervals, and was thus kept afloat.

South American Cable Interruptions.—United States Consul Isaac A. Manning, at La Guaira, Venezuela, in a communication states that at various times during the past year the cable of the French Cable Company giving communication between Venezuelan ports and the United States has been seriously interrupted, frequently for several days at a time. This, he says, has been a source of serious inconvenience to merchants and others interested in trade between the two countries, as the only communication possible has been, under these circumstances, via Guadeloupe and the West India Cable Company, with an extra charge of $1.24 per word to or from the United States and of $1.10 to or from Europe. The interruptions have occurred from storms among the land lines crossing Santo Domingo or by the cable being fouled by vessels in the shoal water of the Dominican coasts. He advocates the laying of an American cable connecting the United States with the ports of Colombia and Venezuela. This would unquestionably have to be done by the French Cable Company which has the cable concession from Venezuela. The concession still has several years to run. [As a matter of fact the business between the United States and Venezuela is not sufficient to support one cable. Therefore, a second cable is out of the question.—Ed.]

British Postmaster-General on Cable Rates.

The British Postmaster-General delivered an address on cable rates at the annual dinner of the British International Association of Journalists on January 28. He said in part:

"The present cable rates, so far as they are used by business men, are not unduly high, owing to the rapid growth of the use of code telegraphy. But the case is different in regard to cablegrams in plain language, whether they are social telegrams or press telegrams. The assent of nearly all of the great cable companies throughout the world has been obtained to a reduction of fifty per cent. in the charges for plain-language telegrams which are subject to be deferred for a time not exceeding twenty-four hours in any case. The assent of one or two foreign administrations is still to be obtained to that reform. It is not possible at the same time to press the cable companies for a reduction of press rates. That is a reform for the future. When the reduction in the charges for uncoded deferred telegrams has been carried through, it is intended to give immediate attention to certain questions as to unduly high rates for press cablegrams."

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William Hutchinson, manager of the Commercial Cable Company's office in the New York *Herald* building, died March 1, at his home in Brooklyn, N. Y. He was born at Chorley, Lancashire, England, February 9, 1870, and became an operator in the British Post Office Telegraphs. He came to New York in 1890, and has been identified with the Commercial Cable Company since that year.

Canadian Notes.

Mr. Geo. Matthews, who left the Quebec office of the Great North Western Telegraph Company seven years ago to work in the main office of that company at Toronto as operator, later becoming assistant traffic and wire chief, has returned to the Quebec office to become chief operator. Mr. Matthews is a native of Quebec, and learned the telegraph business in the office of which he now comes to take charge.

Canadian Old-Timers.—"Old-time telegraphers" of Edmonton, Alberta, Canada, met in reunion recently and talked over the early days of the telegraph in that region. The "early days" in that new country were in 1879, when the first telegraph line was strung into Edmonton. Mr. Alexander Taylor received and sent the first message. Among those present at the meeting, besides Mr. Taylor, were Messrs. George Fraser, M. C. Wright, George A. Reid and J. S. Macdonald, superintendent of Dominion Telegraphs at Edmonton.

No Case Against Canadian Managers.—The conviction registered against certain Canadian telegraph managers for violation of the Miller Act by transmitting betting information has been quashed on the ground that there is nothing to connect them with the alleged offence.

The Late Mr. McMichael.

Mr. S. B. McMichael, assistant general manager of the Great North Western Telegraph Company of Canada, Toronto, Ont., requests us to publish the following note: "On behalf of Mrs. I. McMichael, Miss Edna McMichael and myself, I wish to express our appreciation of the many kind words of sympathy conveyed to us by the officials of the telegraph company and the close personal friends of I. McMichael at the time of our recent bereavement."

Municipal Electricians.

The Gamewell Fire Alarm Telegraph Company, will on May 1 move its offices to the Underwood Building, now being erected on the corner of Church and Vesey Streets, New York.

Telephone Fire Alarm System.—The Denio General Electric Co., of Rochester, N. Y., has arranged to install its telephone fire alarm system in connection with the system of the Utica Home Telephone Co., Utica, N. Y. This converts every telephone connected with the Home plant into an automatic fire alarm station.

New York's Fire Alarm Telegraphs.—Commissioner Rhinelander Waldo, of the New York Fire Department, in his annual report for 1910 states that the fire-alarm telegraph system in the Borough of Manhattan should be replaced as quickly as possible, and that an electrical engineer has been appointed to superintend the replacing of the present antiquated system.

Electrical Exhibits at Convention of Chiefs of Police.—Police telegraph and signal systems will be shown at the exhibition to be held in connection with the eighteenth annual convention of the International Association of Chiefs of Police in Rochester, N. Y., June 13 to 17, inclusive. Mr. J. M. Quigley, chief of police, Rochester, N. Y., is chairman of the committee of arrangements to whom all communications regarding exhibits should be addressed.

Fire Alarm System in Kansas City.—A system of turning in fire alarms from street corners is to be installed under the direction of Mr. Bert Haldeman, electrician of the fire department at Kansas City, Mo. The new plan contemplates connections with the Gamewell system of the police department and will notify both fire and police headquarters. Separate apparatus will be installed for fire alarms. Indicators in both police and fire headquarters will designate the locality from which the alarm is sent in.

The New Standard Volt in France.—Announcement has been made by the Laboratoire Central d'Electricité, Paris, of the change in the value assigned to the standard Weston cell, in accordance with the recommendations of the International Committee. The new value is now in effect in France, Germany and the United States. It was adopted by the Bureau of Standards at Washington, January 1, as announced in these columns March 1.

Electrical Engineering Exhibition in England.

The third triennial exhibition of Electrical Engineering and Machinery will be held at the Olympia, London, from September 23 to October 21, both dates inclusive. It is to be international in character. Information regarding the exhibition may be obtained of the Bureau of Manufactures, Washington, D. C.

Mr. M. W. Jones, chief train despatcher of the Guayaquil and Quito Railroad, Guayaquil, Ecuador, formerly identified with the Western Union Telegraph Company's service at New York, in renewing his subscription for another year, writes: "I certainly could not get along without the Age. It keeps me in touch with the doings of my many friends 'Along the Great White Way' and other ways so that although I am a good many miles from New York I will not be entirely 'green' if I should return."

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High Power Telephone Transmitter and Automatic Telephone Repeater.

Mr. C. Adams-Randall, of New York, has invented a telephone transmitter of high power and an automatic telephone repeater, both of which were exhibited in practical operation at the recent convention in Chicago of the National Independent Telephone Association. The tests, it is stated, proved highly satisfactory and much enthusiasm was manifested in the devices by the delegates present.

The transmitter differs in several essential features from its predecessors. The fundamental difference consists in combining a variable resistance, preferably carbon granules, under pressure, with a vibratable non-conducting diaphragm, in contradistinction with the present instrument in which the carbon granules are held in a loose free state, the speaking contact being obtained by the weight of the loose granules.

Under Mr. Randall's method of construction, a low normal resistance is obtained that permits the use of a low-power current-energy and also affords a greater conducting capacity for any increased energy, generally in proportion to the cross section of the subdivided mass of granulated carbon, or variable resistance, when confined under pressure.

With instruments of this class a current energy may be employed equal to that now generally used with granular transmitters, and, when required, a current energy many times greater than is now possible may be utilized without any change in construction or adjustment, and with proportionate increased efficiency.

The maximum current energy that may be used is yet undetermined, but with the instruments at present in use the power may be increased three, four or more times that of the standard transmitters. This increased power means increased distances of operation, which has been proved on actual telephone lines. It also means, it is claimed, that the present costly low-resistance circuits may be duplicated at greatly reduced cost by the use of smaller copper or iron wire. Assuming, from a profitable commercial basis taking into consideration the various details of practical telephony, such as current consumption, cost of circuit construction, electrical troubles arising from induction, leakage, etc., that the distance of direct transmission must be limited to 1000, 2000 or 3000 miles, it naturally follows that to increase this maximum distance two, three or more times, the messages must be re-transmitted or repeated manually or automatically. As manual re-transmission is impracticable, an automatic telephone repeater becomes an actual necessity if the telephone is to have as wide a scope as the telegraph.

The Randall automatic telephone repeater differs radically in principle of operation, construction and in application from all previously patented repeaters. It is operative on longer circuits and is more efficient on present circuits. It bears the same relation to telephony that the telegraph repeater does to telegraphy.

This invention has for its object the re-transmission or automatic repetition of telephone messages from the terminal of one circuit into or over a second circuit, and from a second circuit to another or other circuits, much in the same manner as telegraph messages are automatically re-transmitted. The essential elements are: electromagnetically-operated telephone transmitters of special construction, and electromagnetic controlling devices, the operative parts being in duplicate, one-half being in one circuit, and the other half in a second main line circuit or a local circuit when used as a relay.

The electromagnetic transmitters are actuated by the voice-caused currents passing from the distant transmitting station over the circuit of which it is a part, and serves to automatically re-transmit the spoken messages into or over one or more separate and distinct circuits.

The repeater transmitting apparatus comprises an electromagnetically-operated transmitter, a suitable transformer, and a local battery, normally open, connected in circuit through the action of the electromagnetic controller. The controller of the apparatus is of the telegraph relay form, and automatically makes or breaks the main line and local circuits connected to the circuit-closing devices of the controller.

The controller is actuated by a current energy much greater than that of the voice-caused current in general use, such as is obtained from a main line battery, or preferably by means of a local battery in circuit with the electromagnet of the controller. In this arrangement the action of the local battery and the controller is determined by the action of a suitable relay included in the main line metallic telephone circuit, at or near the repeater, or on one side of the metallic circuit grounded. The latter arrangement overcomes all trouble resulting from bridges on the metallic circuit. With bridged metallic circuits it is only necessary to install a suitable condenser in the bridges.

The main line battery for actuating the controller when it is in the main line, or for actuating the main line relay, is included in the circuit at any convenient point or it may be divided, with one portion at the repeater, and another portion at the distant terminal station or elsewhere. The battery is normally open and may be closed manually at either of the terminal stations, when required, with a circuit-closing key attached to the telephone receiver. It may also be automatically controlled at either of the transmitting stations by the act of speaking into the transmitter through the medium of intermediate devices.

The object of the controller is to select, determine and control the main line and local circuits and the local batteries. The controller of one of the main lines when energized, closes the local battery and circuit for the repeater transmitter of that line and also that of the other main line cir-

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cuit, for either sending or receiving. Under this combination of circuits and devices, the two transmitters of the repeater cannot operate simultaneously and therefore humming or singing is effectively prevented, and the necessity of balanced circuits and frequent re-adjustment of the apparatus is entirely overcome.

The electromagnetic transmitters are operated with the current obtained from any good granular transmitter and when thus operated will re-transmit into a second separate circuit of equal or greater distance. With transmitters of greater power the length of circuit from the terminal station to the repeater can be proportionately increased. The automatic repeater therefore serves to double the distance of the primary circuit by repeating into a second circuit and with a repeater at the distant terminal of the second circuit, the message can be automatically re-transmitted into a third circuit with an auxiliary power equal to or greater than that of the manually operated transmitter at the first terminal. On long toll circuits composed of cable and aerial lines with an intermediate automatic repeater present operative distances can be increased two or more times.

With the repeater used as a relay at the terminal of a circuit the volume of tone at the receiving instrument is greatly augmented, and speech that is barely heard by direct transmission becomes as distinct and as reliable as on telephone circuits of moderate length.

For subscribers and toll lines on which the transmission is unsatisfactory this invention is especially applicable and with its use intercommunication is made more reliable; distances increased, and "phantom" circuits more efficiently operated.

In regard to the tests, Mr. C. H. Smith, secretary and general manager, and Mr. P. C. Cockerill, superintendent of the New State Telephone Company, Sioux City, Iowa, report that they repeatedly talked over circuits with the repeater in that could not be talked over without it. The instrument was also tested on the lines of various other independent telephone companies with, it is stated, the most satisfactory results. All those witnessing the tests agree that the Randall repeater will make it possible to talk commercially over distances that have never been talked over before. Speech over long circuits, it is claimed, is as loud, clear and distinct as over local lines.

Radio-Telegraphy.

Mr. John Bottomley, vice-president of the Marconi Wireless Telegraph Company of America, New York, in commenting on the decision in the suit brought by Mr. Marconi against the British Radio-Telegraph and Telephone Company, referred to in another column, stated that if the decision is upheld by the court of last resort in England and followed in other countries it would give Mr. Marconi complete control of the wireless situation.

Wireless Monopoly in South America.—It is announced in Berlin, Germany, that Brazil, Argentina, Peru, Chile, and Uruguay have decided to establish State monopolies in wireless telegraph. The equipment, it is stated, has been ordered from Germany.

Wireless and Aeroplanes.—Wireless telegraphy from and to aeroplanes is attracting much attention among inventors at the present time, and the problem is pressing with increasing demand for its solution. The Goff Aeroplane Company, Chicago, makes model aeroplanes which might be utilized for experimental work of this character. The company makes an interesting proposition in its advertisement in regard to its models.

Jack Binns' Suit.—Mr. Jack Binns, the wireless hero of the Florida-Republic steamship disaster, has brought a second suit for $50,000 against the Vitagraph Company of America for selling moving picture films which purport to represent him in a moving picture drama, "Saved by Wireless." Mr. Binns declared in his complaint that he declined a good offer to go on the stage, and he objects to having the Vitagraph Company making capital out of what he declined to make capital out of himself, on the ground that it belittles him. Since the foregoing was written a verdict for $12,500 was rendered in favor of Mr. Binns.

Detectors and Antennæ.—Mr. John Beattie, of Leete Island, Conn., says, in reference to antennæ for wireless telegraphy: "Two years ago during a windstorm my antennæ were disarranged. While engaged in straightening up the poles my wires, about 1,000 feet of No. 14 naked copper, were laid irregularly as they fell upon the wet grass. I went into the house while my men were straightening the poles and as an experiment I threw my switches over to receive, when to my great astonishment I heard signals from a station fifty miles away.

"I saw a recent article on 'Wireless for Railroads.' I thought I would make some tests and did so, with the following interesting results: I received signals from O H X and T W T without 'earth' connections. These New York stations are ninety miles from this place. I received signals from two steamers on Long Island Sound which were ten or more miles from my station. The antennæ were disconnected and the ground was disconnected. I used a single slide tuning coil, .006 microfarad condenser and a 'Perikon' detector, which is standard in the navy.

"It is possible to receive signals through or from limited distances without the use of extensive highly elevated wires and without the use of a ground connection."

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The "Singing Spark" System of Wireless Telegraphy*.

In December, 1906, Prof. Max Wien in Germany published the first account of a phenomenon on which the new method of wireless telegraphy has been based. In order better to illustrate this phenomenon, let us consider the general behavior of two circuits, one of which (viz., the exciter circuit) comprises a spark-gap, whereas the other circuit is tuned electrically and closely coupled to the former. From its initial maximum amplitude, the oscillation in the exciter circuit rapidly decreases in intensity, so that, after a few oscillations, its energy is communicated to the second circuit and the primary energy becomes exhausted. There will then take place a reflux of energy from the secondary to the primary, until the latter once more contains the whole of the remaining energy, and this cycle is repeated several times. It might be supposed that the spark would be quenched at the very moment the energy had, for the first time, left circuit 1. However, the course of events is, in reality, quite different, the spark being maintained throughout the fluctuations of energy until the oscillation of circuit 2 has vanished almost entirely. The resistance of a spark-gap is known to rise as the current intensity decreases, and as the current amplitude of the exciter at the end of the first stage falls at a certain moment to zero, the resistance of the spark-gap should then be very high. But this is not found to be the case, and owing, it seems, to the accumulation of heat, the increase in resistance lags behind the reduction in current intensity, so that at the critical moment its maximum value is not yet attained. The secondary circuit then exerts an inductive effect on the primary, and the potential difference produced at the terminals of the spark-gap, owing to the still moderate resistance, results in the production of further sparks. The spark discharges, owing to this reflux of energy, are thus never discontinued, and the resonance curve of such a coupled system always yields, in the place of the fundamental vibration of the tuned system, two new frequencies different from the former, viz., what are called two coupled waves. Prof. Wien's experiment was as follows:

While examining, by means of a resonance circuit, two such vibratory circuits closely coupled together, of which the primary one contained a very short spark-gap, the Profressor found, instead of the usual two coupling waves, a system of three waves. This phenomenon was due to the resistance of the very short spark-gap increasing very rapidly, so that, the vibrations in circuit 1 disappearing rapidly, only those of circut 2 were left. The latter then could go on vibrating, as an uncoupled individual system with its own frequency of vibration and damping.

Count Arco, of the German Wireless Telegraph Co., took up this experiment with a view to obtaining by its means nearly undamped vibrations, and in conjunction with Mr. Rendahl succeeded in working out the system of wireless telegraphy, termed the "singing-spark" method, of which a short description follows.

The sender consists of an exciter circuit, containing the "quenched spark-gap," as Prof. Wien's arrangement is called. To the exciter circuit is coupled, inductively or otherwise, the tuned antenna system, the coupling between the two circuits being on the one hand so close as to cause the exciter energy to pass as quickly as possible; and, on the other hand, so loose as to damp any waves outside of the secondary main vibration. Coupling efficiencies of 15 per cent. to 20 per cent. are obtained in most cases, the damping of the wave emission being, in the case of slowly-radiating umbrella or T-antennas, about .08 to .1 if the antenna vibrates with its fundamental wave, and only .05 to .03 if the wave be extended to three or four times the fundamental vibration. The condition of the spark-gap does not exert any influence on the frequency of the second circuit, and accordingly it does not need to be regulated. The period is, on the contrary, absolutely constant, so that resonance can be fully utilized.

In order to control the wave length, either the capacity of condensers or the inductance of inductive coils—or both factors—can be altered, the most convenient method being the variation of inductive coils, as used in wireless telegraphy in the shape of "variometers." While the latter had previously only been designed for low pressures and current intensities, so as to be suitable only for the receiver, the German Wireless Telegraph Company succeeded in designing them for receiving very considerable amounts of energy, so that they could be employed in connection with the sender. The sending variometer consists of a fixed disk and a rotary disk, both of which are wound with wire, the windings being arranged either in series or in parallel. When the disks are adjusted so that the fields of the four coils are added, the self-induction will reach a maximum, whereas, in the event of the fields being in opposition, the self-induction is a minimum. The intermediary positions then yield any value comprised between these extremes. Variations in the ratio of 1 : 16 can thus be obtained by a complete rotation and a single change from parallel to series with the variometer.

In the case of a constant primary capacity, the variometer thus allows the wave to be altered from 1 to 4—e. g., from 500 to 2,000 metres; and more complicated constructions even allow of a continuous variation between 1 and 5. In order further to increase the range of waves, either the variometers are changed or the capacity is altered by steps.

As regards the feeding current of the exciter, a maximum number of impulses being desirable, alternating currents of about 500 to 2,000 cycles per second were adopted, giving a succession of 500 to 2,000 spark impulses per second. The reg-

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ularity of this spark generation can be made so great as to convert the noise of the spark into a real musical sound. The purity of the latter plays an essential part in connection with the utilization of energy and freedom from disturbance in the receiving apparatus.

The alternator current is transformed with a view to charging the exciter capacity to from 4,000 to 70,000 volts, according to the dimensions of the station. This transformation is effected in large stations by means of an induction coil, and in smaller stations by a transformer.

The high-frequency apparatus of the exciter circuit will now be described. The main point in this connection was the design of the quenched spark-gap itself, in which connection many difficulties had to be overcome. In order to make the succession of sparks quite regular, the electrodes were given the shape of rings, the active surfaces being planed. In order to keep the electrodes at very short distances apart, mica was inserted at the circumference. By distributing the total energy over several spark-gaps, the experimenters were able to convert any amount of energy into electric vibrations. Copper and silver metals of great heat conductivity were chosen as electrode materials. The large number of individual spark-gaps, so far from complicating operations, allows a very simple regulation of the transmitted energy.

In contrast to the trouble caused by the spark-gap, the design of the capacity did not offer any difficulty. As, owing to the rapid quenching of the primary circuit, any excessive care in regard to slight losses was quite superfluous, the experimenters were able to substitute for the Leyden jar the far less efficient paper condenser, of which a sufficient number were connected up in series.

In connection with both the capacity and the third element of the exciter circuit, the inductive coil, maximum safety and minimum volume were the most important points to be considered. The rapid quenching of the exciter circuit ensured an economy previously unknown in the production of high-frequency oscillations, the efficiency coming very near 100 per cent.

Far more difficult was the design of the secondary circuit, as the energy in the latter is kept up for a very long time, while its damping determines the damping of the electric wave given out. The Braun arrangement, in conjunction with slowly radiating slightly damped antenna, was provisionally adopted, in spite of many drawbacks. Very fine subdivided copper wire of 0.07 mm. diameter was used in winding the secondary circuit. Owing to the very high current intensities in the antenna, very low resistances had to be designed. In the case of the smallest type, the 2-kw. station, the antenna coils were made up of 480 individual conductors connected up in parallel whereas the 8-kw. station comprises upwards of 3,000 wires, each of which has exactly the same resistance and self-induction.

In order to allow the wave length of the antenna to be readily varied, one section of these coils has been designed with continuously variable self-induction, while the remainder is variable by steps. Whereas the old exciter method at most allowed of an extension of about 1.5 times the fundamental vibration of both parts, of a very extended wave variation.

At the receiving station the detector consists of a contact between a thin graphite point and a plate of lead sulphide or iron peroxide (mostly the latter), which contact has a resistance of several thousand ohms. Such detectors work as current rectifiers, and, without any auxiliary battery, transform alternating currents into waning trains of pulsating continuous current. One thousand such wave trains per second, given out from the musical sender, are received as 1,000 direct-current trains, and, provided the impulses be of sufficient regularity, cause a membrane to give out a musical sound. In order to produce a given sound intensity, a smaller current amplitude in the telephone suffices than in the case of the ordinary irregular impulses perceived as noises.

The musical sound of the sparks imparts to each sender, in addition to its own wave-length and damping, another characteristic. Musically pure sounds are known to be perceptible, even if very feeble, and accordingly allow telegraph operation to be carried on even during the most violent atmospheric disturbances. The operator thus can ascertain by the pitch of the sound which station a given wave train comes from. Owing to the large scale of sounds embraced by the ear and the telephone, a very wide interval of variation (from about 200 to 2,000) is thus obtained by very simple means. By means of a resonance relay, the selectivity, as well as the sensitiveness of the arrangement, is increased considerably. The apparatus can also be designed for Morse signals, which are used whenever the subjective method fails.

The Morse receiver is actuated by a resonance relay and ensures a mechanical accumulation of undamped sender impulses. It may be said to be the first graphical receiver free from disturbance which has so far been produced in wireless telegraphy, as well as the first graphical receiver which can be used over about the same range of distances as the acoustic receiver.

The smallest type of apparatus, which requires a primary power of 1.5 kw., in the case of 20 metres (66 feet) antenna height ensures wireless communication to 200 km. (124 miles), and with an antenna of 35 metres (115 feet), to 600 km. distance (373 miles). The 8-kw. apparatus, with an antenna 60 metres high, has a guaranteed range of 2,500—3,000 km. (1550—1865 miles), and that of 20 kw., with 85 metres (279 feet) antenna height, a range of 3,500—4,500 km. (2175—3000 miles) over a level country, or the sea. The 2-kw. station can be mounted as a portable land station in a military vehicle.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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March 16, 1911.

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

Western Union Pension Scheme.

We have heard many expressions of satisfaction from all quarters regarding the proposed adoption of a pension system by the Western Union Telegraph Company. The plan when carried out will, of course, cost the company a large sum of money, but, on the other hand, it will receive in return service from satisfied employes that it could not obtain in any other way. The good will and loyalty of the employes is of far greater value to a large corporation than dollars and cents.

In an extensive business there are two important factors to be considered—the employer and the employe. One cannot get along without the other and it is to the interest of both parties that the relations between the two be harmonious. This principle is being more and more recognized by large employing organizations, and in its practical application great benefits result to employer and employe alike. Apart from the radicals and chronic "kickers" in the ranks, which happily are relatively few in the telegraph service, the greatest good to the greatest number will result from the practical operation of the pension plan. It will be a great satisfaction to the employes to know that long, faithful service will be recognized and rewarded by the employing company.

After a man has devoted the best years of his life to the service of the company common justice entitles him to some reward in his declining years, when he is physically unable to perform his duties as in the past.

The effect upon the minds and habits of operators in line with the pension list will be wholesome. It will have a steadying tendency upon those who have an itinerant disposition, and bring them to a realization that it will be to their own interest to hold their present positions as long as possible; prepare themselves for higher positions, and be faithful to their employer. If they move about and are unmindful of their obligations towards the company it is their own loss.

In whatever light the proposed system may be viewed there can be no question as to the advantage to both parties concerned. The employes will work with a mind free from fear as to what will become of them when they grow old. This feeling will be uplifting and result in the individual rendering better service. The company's benefits appear at this point. In the long run the company will gain much more in better and continuous service than it pays out in pensions. The company is certainly to be commended for its interest in the welfare of its deserving employes.

A Lesson in Loyalty.

The following little essay from the pen of Mr. Elbert Hubbard is of general application and will be read with interest.

A business is a steamship bound for a port called Success. It takes a large force of men to operate this boat. Eternal vigilance is not only the price of liberty, but it is the price of every other good thing, including steamboating.

To keep this steamship moving, the captain requires the assistance of hundreds of people who have a singleness of aim—one purpose—a desire to do the right thing and the best thing in order that the ship shall move steadily, surely and safely on her course.

Curiously enough, there are men constantly falling overboard. These folks who fall overboard are always cautioned to keep away from dangerous places, still there are those who delight in taking risks. These individuals who fall off, and cling to floating spars, or are picked up by passing craft, usually declare that they were "discharged"—they say the captain or the mate or their comrades had it in for them.

I am inclined to think that no man was ever "discharged" from a successful concern—he discharges himself.

When a man quits his work—say, oiling the engine or scrubbing the deck—and leans over the

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side calling to outsiders, explaining what a bum boat he is aboard of, how bad the food is and what a fool there is for a captain, he gradually loosens his hold until he falls into the yeasty deep. Now, there is no one to blame but himself, yet probably you will have hard work to make him understand this little point.

When a man is told to do a certain thing, and there leaps to his lips or even to his heart the formula, "I wasn't hired to do that," he is standing upon a greased plank that inclines toward the sea. When the plank is tilted to a proper angle, he goes to Davy Jones' locker, and nobody tilts the fatal plank but the man himself. And the way the plank is tilted is this: The man takes more interest in the passing craft and what is going on on land, than in doing his work on board ship.

So I repeat: No man employed by a successful concern was ever discharged. Those who fall overboard, get on the greased plank and then give it a tilt to the starboard.

If you are on a greased plank, you'd better get off from it, and quickly, too.

Loyalty is the thing!

Now Is the Opportunity.

Mr. W. S. Barker, district plant superintendent, Western Union Telegraph Company, Boston, writes:

"Some one has well said that the past is secure. No matter what it has had or what it has been, this company has at its head today big men, men who are leaders, organizers and who have been and are now successful; one of their best assets is their knowledge of the details of the business which they are handling. They will make this company bigger and better than it ever was before and herein lies the opportunity of every telegrapher. I have never known a time when the future of the ambitious, honest hardworking telegrapher looked as bright as it does today."

Multiplex Telegraphy.

BY JOHN B. TAYLOR, SCHENECTADY, N. Y.

In your issue of March 1 you print and refer editorially to an article headed "Multiplex Telegraphy," by Mr. S. R. Beatty. As many enterprising men in the telegraph field who are not perhaps well versed in the calculation of alternating current circuits may devote some time to the study of this article and feel that some of their practical ideas are upset, it seems desirable to point out the serious mistake made by Mr. Beatty on which his calculations and conclusions are based. This mistake rests on his assumption that in the typical telegraph line, resistance, reactance and capacity are all connected in series, whereas the actual circuit may be pictured as a large number of combinations of sections, each composed of resistance and reactance in series, with capacity in multiple from line to ground. This results in current being transmitted in the form of a wave with maximum values of current and potential occurring at different times in different parts of the circuit, and different values of current at sending and receiving ends. The fallacy of calculating a value of current on this serial assumption is shown by comparison of the two examples given, in which cases the current is figured as being very much less for a 90 mile line than for one 345 miles in length. If another example is worked out on the same assumptions, and the length of line reduced to, say one mile, the answer would indicate that almost no current could be sent over such a short line, which any practical telegrapher, whether versed in alternating current or not, will immediately see is ridiculous.

The exact calculation of values of alternating current and voltage at different points in a long line is far from a simple matter. Where no great accuracy is desired, certain approximations can be made, such as assuming that the capacity of the line instead of being uniformly distributed, is concentrated and connected between line and ground at the halfway point.

Exact calculations for telephone and telegraph lines are carried out by formulas involving hyperbolic trignonometry as written up in various papers by Dr. A. E. Kennelly and others. Those of your readers who do not immediately see the fallacy in Mr. Beatty's treatment of the question will probably not be ready at once for taking up the hyperbolic functions.

Regarding the suggestions on adjustment of relays, my practical acquaintance with operation of quadruplex circuit is not sufficient to warrant any comments, except to point out that the law of inverse squares applies only to magnets of very special form and cannot be taken as applying to commercial forms of relay magnets.

Incidentally, in the formula given for current in a serial circuit of resistance, reactance and capacity on page 196, the symbol C should be capacity in farads, and not in microfarads. The value in farads has apparently been taken for making the calculation, although the arithmetic does not show it.

Multiplex Telegraphy.—In the article published in our issue of March 1, under the title "Multiplex Telegraphy," by Mr. S. R. Beatty, an error in the equation on page 198 passed unnoticed. It was due to reading the figures on a wrong line in the table of logarithms used in solving the problem. The result of the calculation was given as .173 watt, when it should have been .008576 watt.

Production of Platinum in the United States.—The Geological Survey, Washington, in its report for 1909 shows that 672 Troy ounces of platinum were produced in the United States during that year. The value was placed at $12,803, about $19 an ounce. Platinum is produced in this country only as a by-product of placer gold mining. The principal supplies of platinum come from Russia, the mines being in the Ural mountains.

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Marconi English Patent Upheld by English Court.

The English patent granted to Mr. G. Marconi relating to the principle of tuning in wireless telegraphy has been upheld by an English court in a decision rendered February 21. The defendant in the suit was the British Radio-Telegraph and Telephone Company. The charge was infringement and in its defense the Radio Company claimed that the principle of the patent in suit was anticipated in an English patent issued to Braun in 1889.

The defense claimed that Marconi was absolutely anticipated by Braun in "loose-coupling" tuning. The counsel for the plaintiff claimed that Mr. Marconi had conceived the desideratum of having a closed reservoir which should gently give out energy, and the idea of a reservoir circuit which should have a constant oscillation backward and forward of such character that the oscillations would only gradually be given out to the other circuit, so that it should persistently oscillate. There was not, he said, a trace of these principles in any document before the date of the Marconi patent; there was no hint about it in Lodge, and there was no "building up" in Lodge. The result of the resonance that one got by tuning everybody knew, but the one thing that people did not know was that connecting a closed reservoir with an open aerial and attuning these, apart from trying to tune the aerial in one to the aerial in the receiver, was in fact an application of a well-known method of tuning in a new way and for a new purpose.

The Marconi interests claim that the patent upheld covers the entire principle of wireless tuning. As described in the patent specifications, the invention consists in including in a wireless-telegraph system, at the transmission station, the combination, with an oscillation transformer of a kind suitable for the transmission of very rapidly alternating currents, of a persistent oscillator and a good radiator; one coil of the said transformer being connected between the aerial wire and earth and the other coil connected in circuit with a condenser, a producer of Hertzian oscillations in the form of a spark producer, and an induction coil (constituting the persistent oscillator) controlled by a signaling instrument. The complete system also includes at the receiving station an oscillation transformer, one coil whereof is included between the aerial receiving wire and earth, constituting a good absorber of electrical oscillations, while a device responsive to electric waves, such as an imperfect contact or a device for operating the same, is included in the circuit with the other coil of said transformer. The system also requires at both stations the inclusion in the lines from the aerial conductor to the earth of variable inductances and the use at both stations of means for varying or adjusting the inductances of the two circuits at each station to accord with each other. The specification states that by this arrangement a perfect tuning of the apparatus is secured at a transmitting station and one or more of a number of receiving stations.

Maintenance of Storage Batteries.

Mr. W. P. Cook, of the plant department of the Pacific States Telephone and Telegraph Company, Seattle, Wash., gives, in the *Pacific Telephone Journal*, some notes concerning the care of storage batteries in general, that may be of interest to those engaged in this class of work. Since the vital question concerning storage-battery maintenance is in determining when and how long to charge them, it is therefore very desirable to be able to properly regulate these periods in order to prevent unnecessary overcharging or dangerous undercharging. Frequently the voltage readings exclusively are relied upon to determine these periods, while again the specific gravity readings alone are used. The specific gravity method is to be preferred, owing to the gravity changes being almost directly proportional to the charge or discharge, that is, if when a battery of the "Chloride" type fully charged tests 1.210 specific gravity, it will be found 1/3 discharged when it tests 1.205 S. G., 2/3 discharged when it tests 1.200, and discharged the allowable 15 points when it tests 1.195. These figures pertain to a cell that is filled with plates. Where the cells are only partly filled with plates the range in specific gravity reduces as the number of plates is reduced. In practice where a battery is charged daily it is advisable to raise the specific gravity by charging until it is within five points of the highest reading ever taken for this particular battery. Then, on the overcharge day, usually weekly, the charge should be carried until the fifteen point raise is reached, or until there is no further rise at the end of an hour. It is not uncommon to find the plates covered with lead sulphate, which is white in color, and in cases of this character the charging current should be left on at about one-half normal rate until the white is entirely dissolved, leaving the positive plates clear brown all over. It has been known to require several days of continuous charging to remove the sulphate, and since the sulphate was virtually formed by absorbing a portion of acid from the electrolyte, it would naturally follow that the specific gravity of the electrolyte would raise considerably by the time all of the sulphate was regenerated back into acid.

The cause for the accumulation of the sulphate is insufficient charging, and if the plates are permitted to remain in this condition long enough they will warp out of shape and need replacing. On the other hand, if the batteries are charged too much, the positive grids become soft and weak, letting the buttons fall out and eventually falling to pieces themselves.

The system of raising the gravity a certain number of points each charge and allowing it to drop a fixed number of points each discharge will greatly lengthen the life of the battery. If these observations are then transferred to a record sheet, a graphic picture of the battery will be had, which will illustrate any irregularities. The figures will also exhibit to what extent the batteries are being either under or overcharged.

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The Military Telegrapher in the Civil War.

PART LVI.

Among the few military telegraphers of the Civil War still alive, and who took a prominent and active part in the first year of that memorable struggle, was Mr. L. A. Rose, now of Davenport, Iowa. Mr. Rose's story of his experiences shows what hardships the military telegrapher had to endure. There was no sympathy or sentimentality; every one who enlisted did so to engage in the harshest kind of activity, and the individual was not considered at all. There were no office hours—everyone was on duty all the time. He had to eat and sleep as best he could, and it was not always possible to get the opportunity to do either.

Mr. Rose endured the hardships that fall to the lot of a soldier in time of war, and the excitement of such a life is well portrayed in the story of his experience, a part of which is given herewith. Mr. Rose says:

"On May 8, 1861, while at Erie, Pa., I heard a message passing over the wire addressed to Anson Stager, superintendent of telegraph, Cleveland, Ohio, asking for a supply of operators to enter the United States military telegraph service. I at once applied by wire for a position, getting an answer within an hour and orders to report to David Brooks at Philadelphia for further instructions. I left Erie the same night and arrived at Philadelphia on the morning of May 10. During the day, operators Solomon Palmer, T. A. Davin, W. C. Hall and William MacIntosh of Boston arrived. We all left on the evening train for Havre de Grace to take the boat for Annapolis. Sol. Palmer was acting as captain, having letters to Thomas A. Scott, who was in charge of the government railroads and telegraphs. We arrived at Annapolis about 9 o'clock the next morning and Mr. Palmer presented his letters to Mr. Scott, who, however, did not read them but remarked that he wanted the operators to go to work that night as his own men were worn out.

"Mr. Palmer did not like the way he was treated and said we could go to work for Mr. Scott or go to Washington with him and he would see that we were taken care of. Hats went up, and all said "Palmer and Washington." We boarded a train heavily loaded with troops and arrived at Washington at 9 p. m., tired, hungry, and sleepy, not having had a meal or any sleep since leaving Philadelphia. Mr. Palmer took us to the National Hotel, where he gave us a good meal and told us to be happy until further orders. Mat. Buell of Buffalo and others joined us there in a day or two and all were put to work in the main office. Manager Snyder asked me to go to Beltsville for David Strouse, superintendent of military telegraphs, who wished to have a man there. After consulting Mr. Palmer I went to Beltsville, where I stayed about two weeks. I found Mr. Strouse to be a gentleman, and he did all he could for us. All who knew him regretted his untimely death.

"On June 8, 1861, I began work at the east end of Long Bridge with W. C. Hall and remained there until Alexandria was captured. I was ordered to Camp Trenton, June 24, with General Runyon of New Jersey in command. General Runyon was a gentleman and treated his operators as he did his staff.

"From here I went to guard camp at Springfield station. An operator named Cummings was with me. During the night pickets began firing and Cummings very unceremoniously left me asleep and went down the track to the relief camp. I may say here that General O. O. Howard was in command and sent me my rations in an old grain bag—very good but rather mixed—and if the Ellsworth Zouaves had not been near by I might have been obliged to eat the rations as they came. The Zouaves, however, thought that a telegrapher was deserving of better treatment and soon served me with chicken, bread, milk, etc.

"On the night of July 21 I started from Fairfax for Alexandria for a mess kit and supplies. The train was overhauled by an engine—an operator was wanted by the Secretary of War at Burke's about four miles from Fairfax. I started back and, when the engine ran off the track, I walked to Burke's, where I found the Secretary of War. I laid down for a little rest with an old relay for a pillow and was called by an officer about 4 o'clock in the morning. I opened the office and the battle soon afterwards began. The Secretary of War left and I went back to Fairfax on the first train, where I found Mr. Hall much excited and Col. Johnson of the Third New Jersey Volunteers as cool as a cucumber. General McCunn of New York claimed to be in command as he held a brigadier's commission from New York State. He was afterwards dismissed. Soon after the first battle of Bull Run the operators at Fairfax Court House were excited and took to their horses. Some important orders passed between General Winfield Scott and General McCunn ordering the latter to stop the retreat, but not having a sufficient number of men, he started down the track with his force about 11 p. m. The operators were requested to stay until the last moment and an engine would come after us. We remained until the relief guard ordered us to close and an engine from Alexandria met us about one mile west of Burke's and took us to Alexandria in time to catch the last boat for Washington, orders having been issued to stop all boats. Everybody was excited and there was general disorder. I then took a furlough of two weeks and went home.

"On August 5 I returned to Washington and was assigned to duty at the arsenal office. On August 13 I was sent to Tennallytown, where the Philadelphia reserves were in camp, with General McCall in command. The troops were reviewed by General McClellan August 23.

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While here I had typhoid fever and was laid up for two months. I returned to Washington in March, 1862, and was sent to Wilmington, Del., on the twenty-second of that month, where I was transferred to the American Telegraph Company. I attended the repeater on the Fort Monroe and Washington wire. On November 22 I was sent to 145 Broadway, New York, and remained there until December 28, when I resigned and returned home."

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER XLVII.

What is the distinctive feature of the direct repeating relay described in this chapter?

Describe the effect of turning the switch levers to the left.

What is the reason for using an extra set of contact points on the relay?

Describe the "Testo" cut out switchboard.

What advantage is gained by the use of this board?

How is patching done and other connections made on the "Testo" board?

How are the coils of the combination quadruplex rheostat wound?

Referring to the diagram, what does the upper circle represent?

How is the total resistance calculated after taking a balance?

What is the extra resistance coil of 200 ohms inserted in the line for?

Describe the construction of the box relay shown in Fig. 137.

Why are steel contact points used in place of platinum?

Describe the improvements embodied in this instrument as compared with the ordinary box relay.

CHAPTER XLVIII.

What is an ammeter?

What is the difference between an ammeter and an ampere-meter?

What is a voltmeter?

What is an ammeter used for?

What is a voltmeter used for?

Describe the principle of the Weston voltmeter and ammeter.

What is the effect on the rectangular flat coil of wire when a current is passed through it?

How is the coil attached in an actual instrument?

How is the current conveyed to the coil?

What metal is the spiral springs made of, and why are they so made?

When an ammeter is connected in circuit why does it not change the value of the current to be measured?

Besides measuring currents, for what other purpose may an ammeter be used?

In what respect does a voltmeter differ in construction from an ammeter?

Why is the coil of high resistance placed in series with the movable coil to which the pointer is attached?

What is the principle upon which the construction of the voltmeter is based?

What is the resistance of a coil used in a 150-volt instrument?

What is the resistance of a 300-volt instrument?

Why is the resistance of a voltmeter made as high as it is?

In order to secure accuracy what rule should be particularly observed in the manufacture of a voltmeter?

President Taft Signals to Honolulu.—President 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, which was the sign for the opening of the carnival at 7.30 p. m., February 21, Honolulu time.

To Reduce Telegraph Tolls in New York State.—The Western Union and Postal Telegraph-Cable companies have notified the up-State Public Service Commission that they will meet the complaints of the boards of trade of Lake Placid, Tupper Lake and Saranac Lake and reduce telegraph rates from these and other points in the Adirondacks commencing June 1, when the heavy business from Adirondack points commences. The new rates will be 35 cents, instead of the present 50-cent rate, to New York, Syracuse, Buffalo and other points. The entire Adirondack region, in addition to the complaining points, will have the benefit of the reduced rates.

Denver Tax on Public Service Corporations.—An ordinance has been introduced in the Denver City council to impose a tax of five per cent. upon the gross earnings of all public service corporations which use the city streets. It includes telegraph and telephone companies.

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Mr. Martin Draws the Line at Translations.

T. Commerford Martin, joint author of the two volume "Edison: His Life and Inventions," was recently approached with a proposition for its translation. He threw up his hands and remarked: "The recompense is very small, but even that is somewhat better than my first experience, when, having brought out the first American book on the Electric Motor, an enterprising German translated it into his native language, put his own name to it, and then issued it as a serial, without sending me a single mark—even of esteem." There have been offers for the translation of "Edison: His Life and Inventions" into Spanish, German and French, as well as for a Spanish edition to be used as a textbook in the schools of Cuba.

Night Lettergram Rates.

The table given herewith is reproduced from the Postal Telegraph-Cable Company's tariff book for 1911, and will no doubt be found useful by those who utilize this class of service.

NIGHT LETTERGRAMS

TABLE OF COMPUTED TOLLS FOR NIGHT LETTERGRAMS CONTAINING 50 (OR LESS) TO 250 WORDS

WHERE RATE FOR A DAY MESSAGE OF 10 WORDS IS

NO. OF WORDS	$ .20	$ .25	$ .30	$ .35	$ .40	$ .50	$ .60	$ .65	$ .75	$ .85	$ .90	$1.00	$1.10	$1.15	$1.20	$1.25
50	.20	.25	.30	.35	.40	.50	.60	.65	.75	.85	.90	1.00	1.10	1.15	1.20	1.25
60	.24	.30	.36	.42	.48	.60	.72	.78	.90	1.02	1.08	1.20	1.32	1.38	1.44	1.50
70	.28	.35	.42	.49	.56	.70	.84	.91	1.05	1.19	1.26	1.40	1.54	1.61	1.68	1.75
80	.32	.40	.48	.56	.64	.80	.96	1.04	1.20	1.36	1.44	1.60	1.76	1.84	1.92	2.00
90	.36	.45	.54	.63	.72	.90	1.08	1.17	1.35	1.53	1.62	1.80	1.98	2.07	2.16	2.25
100	.40	.50	.60	.70	.80	1.00	1.20	1.30	1.50	1.70	1.80	2.00	2.20	2.30	2.40	2.50
110	.44	.55	.66	.77	.88	1.10	1.32	1.43	1.65	1.87	1.98	2.20	2.42	2.53	2.64	2.75
120	.48	.60	.72	.84	.96	1.20	1.44	1.56	1.80	2.04	2.16	2.40	2.64	2.76	2.88	3.00
130	.52	.65	.78	.91	1.04	1.30	1.56	1.69	1.95	2.21	2.34	2.60	2.86	2.99	3.12	3.25
140	.56	.70	.84	.98	1.12	1.40	1.68	1.82	2.10	2.38	2.52	2.80	3.08	3.22	3.36	3.50
150	.60	.75	.90	1.05	1.20	1.50	1.80	1.95	2.25	2.55	2.70	3.00	3.30	3.45	3.60	3.75
160	.64	.80	.96	1.12	1.28	1.60	1.92	2.08	2.40	2.72	2.88	3.20	3.52	3.68	3.84	4.00
170	.68	.85	1.02	1.19	1.36	1.70	2.04	2.21	2.55	2.89	3.06	3.40	3.74	3.91	4.08	4.25
180	.72	.90	1.08	1.26	1.44	1.80	2.16	2.34	2.70	3.06	3.24	3.60	3.96	4.14	4.32	4.50
190	.76	.95	1.14	1.33	1.52	1.90	2.28	2.47	2.85	3.23	3.42	3.80	4.18	4.37	4.56	4.75
200	.80	1.00	1.20	1.40	1.60	2.00	2.40	2.60	3.00	3.40	3.60	4.00	4.40	4.60	4.80	5.00
210	.84	1.05	1.26	1.47	1.68	2.10	2.52	2.73	3.15	3.57	3.78	4.20	4.62	4.83	5.04	5.25
220	.88	1.10	1.32	1.54	1.76	2.20	2.64	2.86	3.30	3.74	3.96	4.40	4.84	5.06	5.28	5.50
230	.92	1.15	1.38	1.61	1.84	2.30	2.76	2.99	3.45	3.91	4.14	4.60	5.06	5.29	5.52	5.75
240	.96	1.20	1.44	1.68	1.92	2.40	2.88	3.12	3.60	4.08	4.32	4.80	5.28	5.52	5.76	6.00
250	$1.00	1.25	1.50	1.75	2.00	2.50	3.00	3.25	3.75	4.25	4.50	5.00	5.50	5.75	6.00	6.25

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.

Under a contract dated November 10, 1879, the Western Union Company claims 20 per cent. of this stock, together with the dividends and interest thereon, amounting to $5,873,292 and 38,188 shares of stock. The Bell Company contended that the Western Union was not entitled to any of this stock, as it was not received as a rental or royalty.

The Master awarded the Western Union 20,087 shares of stock and $2,579,914 as dividends and interest thereon, exempting from the accounting stock received by the American Bell from the American Telephone and Telegraph Company, the New England Telegraph and Telephone Company, the Bell Telephone Company of Philadelphia, and Chicago Telephone Company.

Use of Dead Chestnut Poles for Telephone Lines.

In a recent communication Mr. B. Gherardi, engineer of plant, American Telephone and Telegraph Company, New York, says:

"We have recently been considering the advisability of using for poles chestnut trees killed by the bark disease. This disease is believed to have originated on Long Island and has now spread over considerable areas in New Jersey, New York State and Connecticut. Authenticated centers of infection have been discovered as far to the north and east as the northern part of Rhode Island, and as far south as the southern part of Virginia. A number of centers of infection are located in Pennsylvania, Maryland and Delaware, and in

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the other states previously mentioned at points distant from the completely infected region which is centered about New York City.

"The chestnut bark disease is due to a fungus, the spores of which generally enter the tree through wounds on the branches or trunk. From the point of infection the fungus grows in all directions through the cambium and the inner bark until the growth meets on the opposite side of the trunk or limb which is thereby girdled. It has sometimes been found that a few of the outer annual rings of the wood are attacked, but generally the wood is not affected. The injurious work of the fungus is usually completed during the first summer after it obtains a location on the tree, but injury is frequently not apparent until the next spring, when the new leaves put out are stunted and soon wither. The injury to the trunk or the branch to which the fungus has become attached is very much the same in character as if the tree had been girdled—that is, the rise of the sap to the upper parts of the trunk or branch is affected and the death of the trunk or limb results. As the fungus does not work in the wood to any appreciable extent and ceases its activity when the tree is dead, the wood is not damaged as a result of the disease. Provided the timber is used within a reasonable time—say within two or three years after the tree has been killed by the disease—there is no reason why its serviceability for poles is in any way impaired. It should, of course, be understood that dead standing trees are undergoing a certain amount of seasoning, and that generally it is not desirable to allow poles to season for more than two or three years. There is, of course, one feature to which careful attention must be given in case trees killed by the bark disease are used for poles. While the bark disease does not injure the timber, the dead tree is more susceptible to injury from insects and from the usual decay-producing fungi than the live tree. On this account poles cut from trees killed by the bark disease should always be inspected to make sure that no impairment has come from decay or from the work of insects while they have been standing in the forest after being killed by the bark disease fungus."

How to Rise from the Ranks.

In an address before the School of Business of the College of Economics of Marquette University, on "Some Phases of the Telephone Business," President Alonzo Burt, of the Wisconsin Telephone Company, Milwaukee, in discussing organization, made reference to men in executive positions with the Wisconsin Telephone Company who had started in the employ of the company as office boys.

How do you suppose an office boy becomes the head of a department in a big public service company, or in any other?

Simply by attending to business and being ambitious to hold a better position than the one you are holding.

These men as office boys did what they were told to do, and did it well. They kept their eyes and ears open and readily "learned the business" in their particular departments. They saw other fellows getting ahead, watched how they did it, and concluded that what others could do they could do, and they won.

Here is some good advice: Study yourself seriously.

If you are honest with yourself, you know better than any one else what are your weak points. Go still farther and do your best to eradicate the weak points.

No one can improve you as you can improve yourself.

Earn a promotion, and when you have it, earn another.

Remember that the big employer plays no favorites.

He judges entirely by the class of service you furnish and your capability for service of higher order.

Postal's Messenger Force at Dallas, Tex.

The accompanying illustration shows the messenger force of the Postal Telegraph-Cable Company of Texas, at Dallas, Tex. As will be noted all the boys use bicycles, which is evidence that

POSTAL COMPANY'S MESSENGER FORCE, DALLAS, TEX.

speed in the delivery of telegrams is sought to be attained. The boys appear to be wide awake, and the people of that enterprising city are to be congratulated on having such up-to-date messenger service.

Messenger Boy Law in New Jersey.—The New Jersey Senate has passed the Osborne bill, which makes 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.

Any book on electrical subjects can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York.

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Quadruplex Installation and Operation.

The following instructions pertaining to quadruplex installation and operation have been issued from the office of Mr. W. E. Athearn, engineer of equipment, Western Union Telegraph Company, New York, and are printed in the *Journal of the Telegraph* for February 20:

In the rearrangement of the quadruplex apparatus, for long and difficult circuits, a combination of the "differential," and "bridge" principles is employed.

THE NEUTRAL RELAY:—The neutral relay coils are wound differentially, and connected to the main and artificial lines in the usual way. This relay is provided with an auxiliary or holding coil H, which is placed in series with a condenser HC, and connected across the main and artificial lines in the manner indicated in the accompanying diagram Fig. 1. The function of the auxiliary coil is to hold the relay armature closed during the periods of "no magnetism" in the relay, caused by the operations of the distant polechanger.

NEUTRAL RELAY ADJUSTMENTS:—The armature of this relay should not be brought too close to the main line magnet cores, a sufficient amount of air space being necessary to prevent the armature from "sticking," or exhibiting that sluggishness of movement which frequently results from the effects of residual magnetism in the relay cores. It is far more preferable to minimize any such tendencies by increasing the air gaps, and then suitably reducing the retractile spring tension, than by the converse methods of adjustment which appear to obtain to some considerable extent. The tension of the spring, however, should always be sufficient to pull the armature smartly against its back stop whenever the magnetism, excited by the "long end" of the battery is cut down to the value induced by the "short end."

The wider separation between the cores and armature will also lessen the amount of disturbance produced by the outgoing currents upon the home relays as a result of imperfect balances, as well as tend to counteract the effect of earth currents, voltage inequalities, or other irregularities which make an incoming current of one polarity greater or less than that of the opposite polarity.

HOLDING COIL ADJUSTMENT:—The holding coil H should first be adjusted by bringing it as close as possible to the relay armature without actually touching it. Then instruct the distant station to close his No. 2 key and dot with his No. 1 key. While this is being done, plug up the holding condenser, HC until just enough capacity has been inserted to keep the neutral relay armature steady on its front contact under the distant reversals. Between one and two m.fs. usually suffices for that purpose.

THE REPEATING SOUNDER:—Experiments indicate the possibility of being able to dispense entirely with the repeating sounder and of operating the local sounder direct from the front contact of the neutral relay. As the feasibility of doing so has not as yet been fully demonstrated, all neutral relays are now being furnished with front and back interchangeable contacts with a view to further trials in that direction.

REPEATING SOUNDER ADJUSTMENTS:—As in the case of the neutral relay, the armature of the repeating sounder ought to be far enough removed from the magnet core to deprive the latter of its "residual" tendency, without unduly diminishing the attractive force exerted upon the armature, the retractile force of whose spring should be regulated to suit these conditions.

In this way the rapidity of action, so highly essential in this instrument, can be best attained; it being also understood that the local or repeating points of the sounder require to be closely adjusted.

THE POLAR RELAY:—The new form of relay shown is placed in the cross wire of the "bridge," the arms of which are represented by the two windings of the impedance or retardation coil marked "5-U" in the various diagrams. The relay coils may be connected either in "series" or in "multiple," according to line conditions. The "series" arrangement has generally given the best results on long or leaky circuits, while the "multiple" arrangement seems better adapted for short and well insulated lines.

CENTERING THE POLAR RELAY:—Whenever this is necessary, cut off the sending battery, and open the main line by throwing the lever of the "Line Resistance Box" over to the "dead" stop at the extreme right of that box. (See Fig. 2.)

THE MILLIAMMETER:—This instrument (which is connected in series with the polar relay in the bridge) has been specially designed to facilitate the operations of line balancing. It will also indicate the precise value of such portions of the incoming currents as pass through the polar relay, as well as afford—by the character of its deflections—an index of the general condition of the circuit.

The milliammeter may also serve a useful purpose in detecting the presence of underground faults—such as escapes—which generally manifest themselves in a peculiarly distinctive way upon the meter. This arises from the fact that currents of opposite polarity in passing through the fault, produce different electrolytic effects upon the conductor at that point; a positive current tending to oxidize and seal up the fault, while a negative current deoxidizes and further develops the fault. Hence, the balancing of a circuit in which such a fault has appeared, will be rendered more difficult by the changeable character of the resistance of the fault under the current reversals; a balance obtained with one polarity of current to line being immediately destroyed by the current of opposite polarity.

At each disturbance of the balance, the meter needle will first be suddenly deflected to one side or other of its previously assumed position (according to the current polarity) and then gradually move in that same direction until it reaches some other point where the needle will remain in a more or less stationary position. Symptoms of such like character will indicate the particular nature of the

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trouble, to which the attention of the wire chief should immediately be directed.

THE TRANSMITTING APPLIANCES:—The "walking beam" type of polechanger has been discarded in favor of the more efficient apparatus shown in Fig. 3, which is equally well adapted for transmission purposes on the common side, and can therefore be utilized either as a polechanger, or as a No. 2 transmitter.

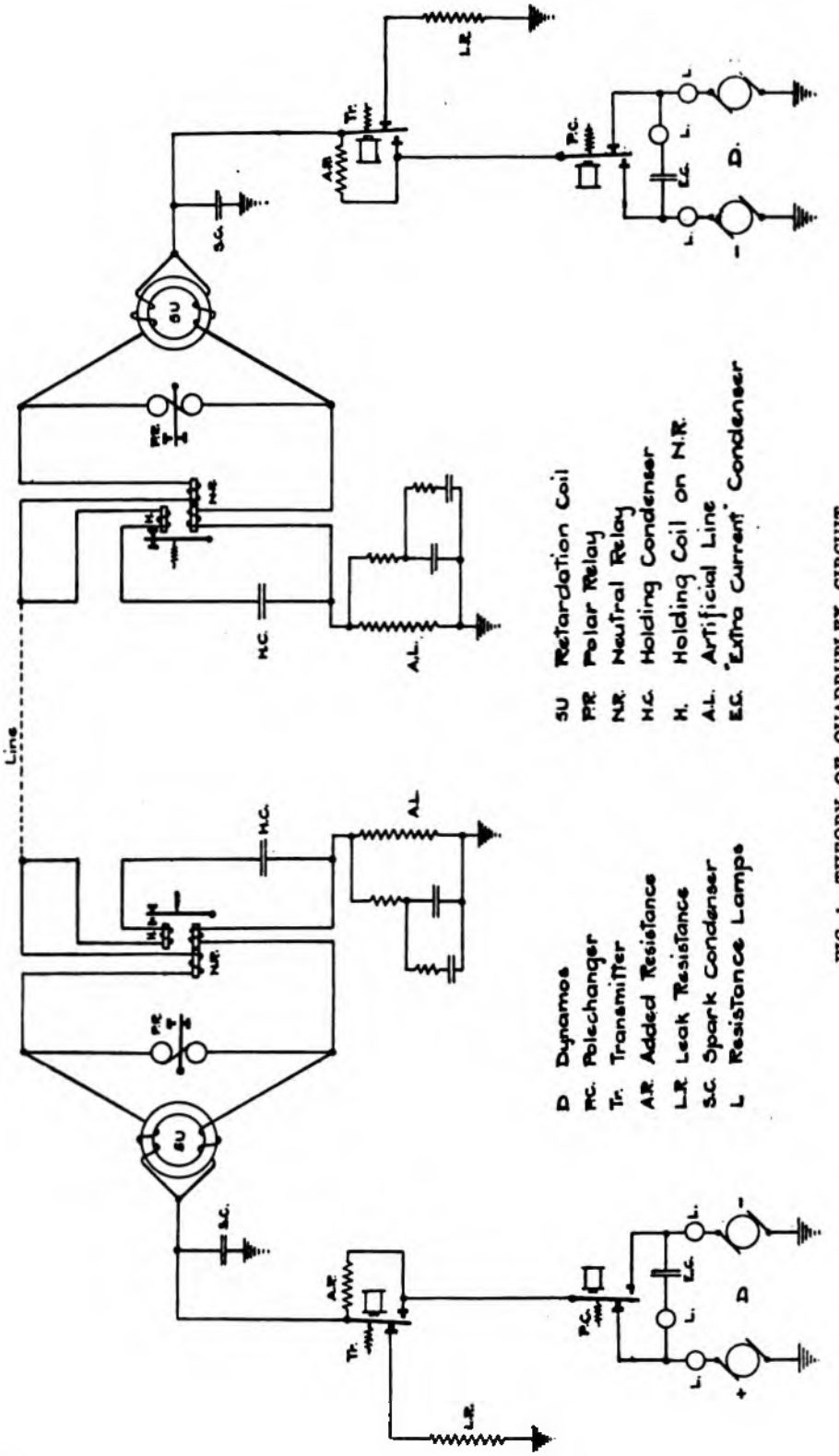

FIG 1.—THEORY OF QUADRUPLEX CIRCUIT.

TRANSMITTING APPARATUS ADJUSTMENTS:—The coil adjustments of both polechanger and transmitter should normally be such as to leave an air space of

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about 1-64 inch (or not less than 4 thicknesses of an ordinary receiving blank) between the armature and cores of each instrument in its closed position.

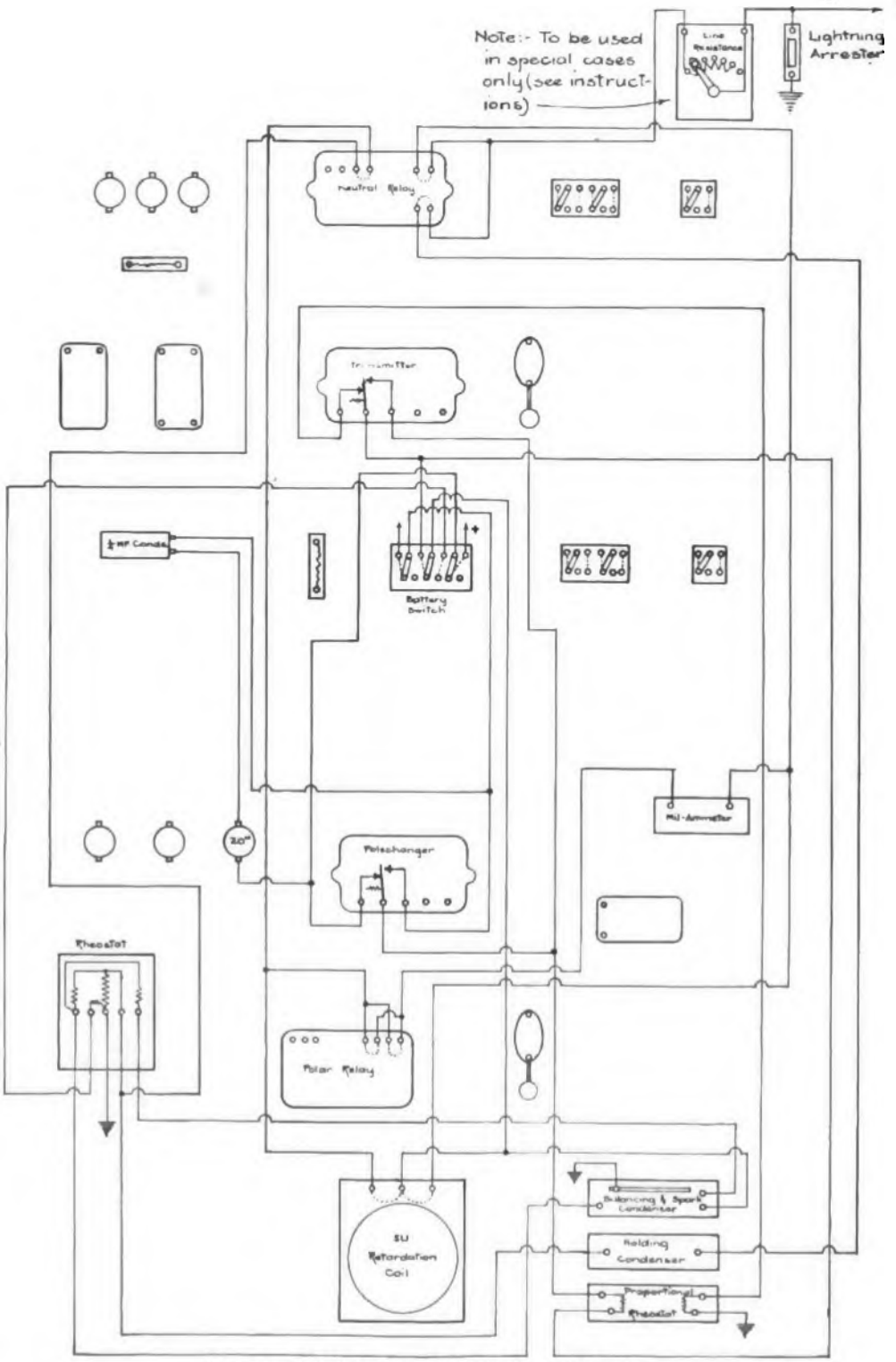

FIG. 2.—WIRING OF MAIN LINE CIRCUITS.

When used as a polechanger, the play of the armature lever between its battery posts should be as small as is possible without creating a tendency to "arc," which is liable to occur at the breaking of battery contact. To minimize such tendency, a small ¼ m.f. condenser EC in series with a 20-ohm resistance lamp is now placed across the battery leads as illustrated in diagrams (Figs. 1 and 4.)

The sparking that apears at the making of bat-

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tery contact represents the static discharge from the main and artificial lines. The particular object of the spark condenser SC is to open up an inductive path to ground for this discharge, the effects of which are thereby diminished at the contact points of the polechanger.

THE 5-U RETARDATION COIL:—This is a differentially wound magnetic or impedance coil, consisting of a circular core of soft iron wires, upon which are placed the two windings that constitute the arms of the bridge. Being of the "closed magnetic circuit" variety, this type of coil possesses consid-

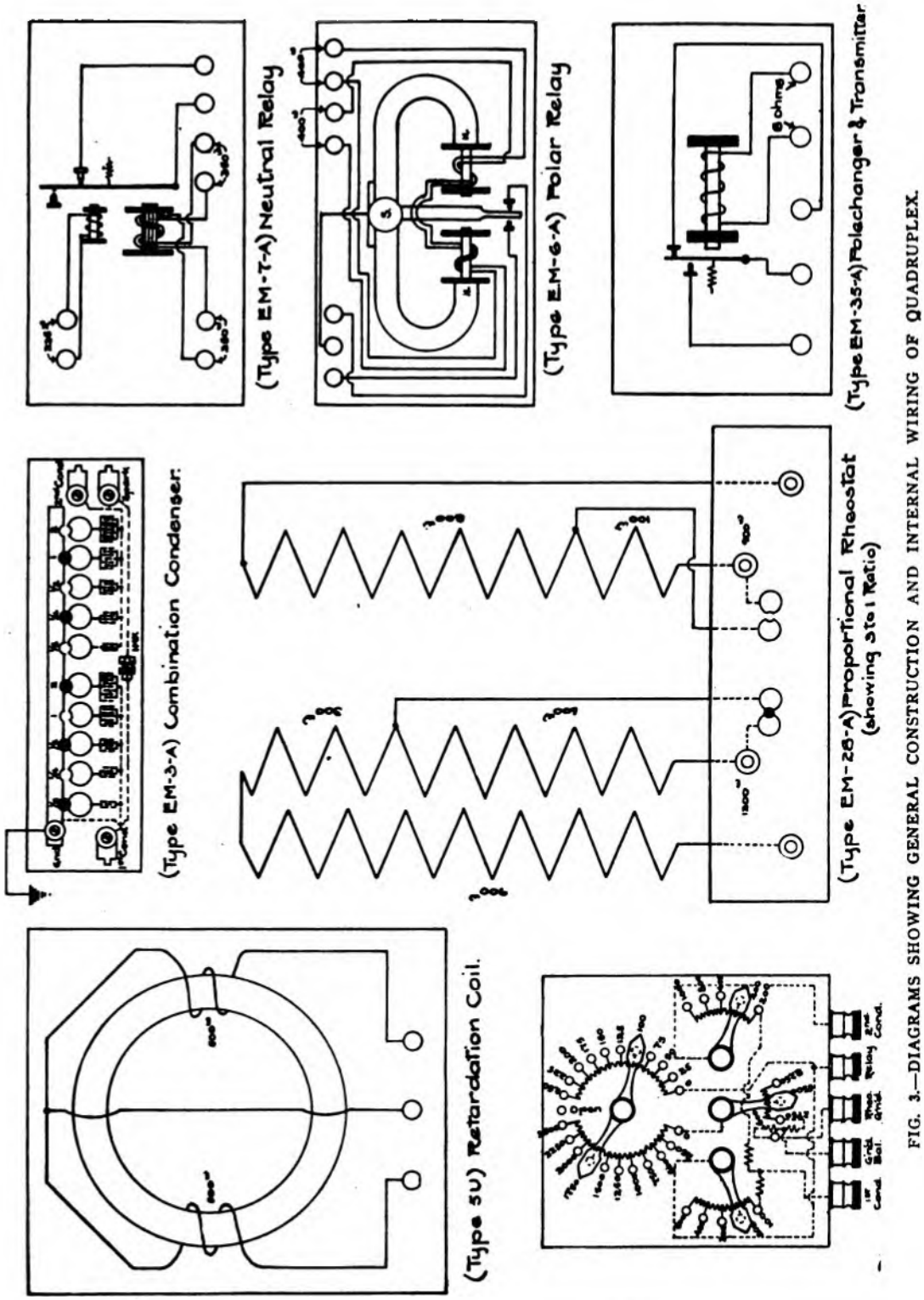

FIG. 3.—DIAGRAMS SHOWING GENERAL CONSTRUCTION AND INTERNAL WIRING OF QUADRUPLEX.

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erable inductance, a property that tends to retard the passage of the current and to change the form or character of the wave passing through the circuit.

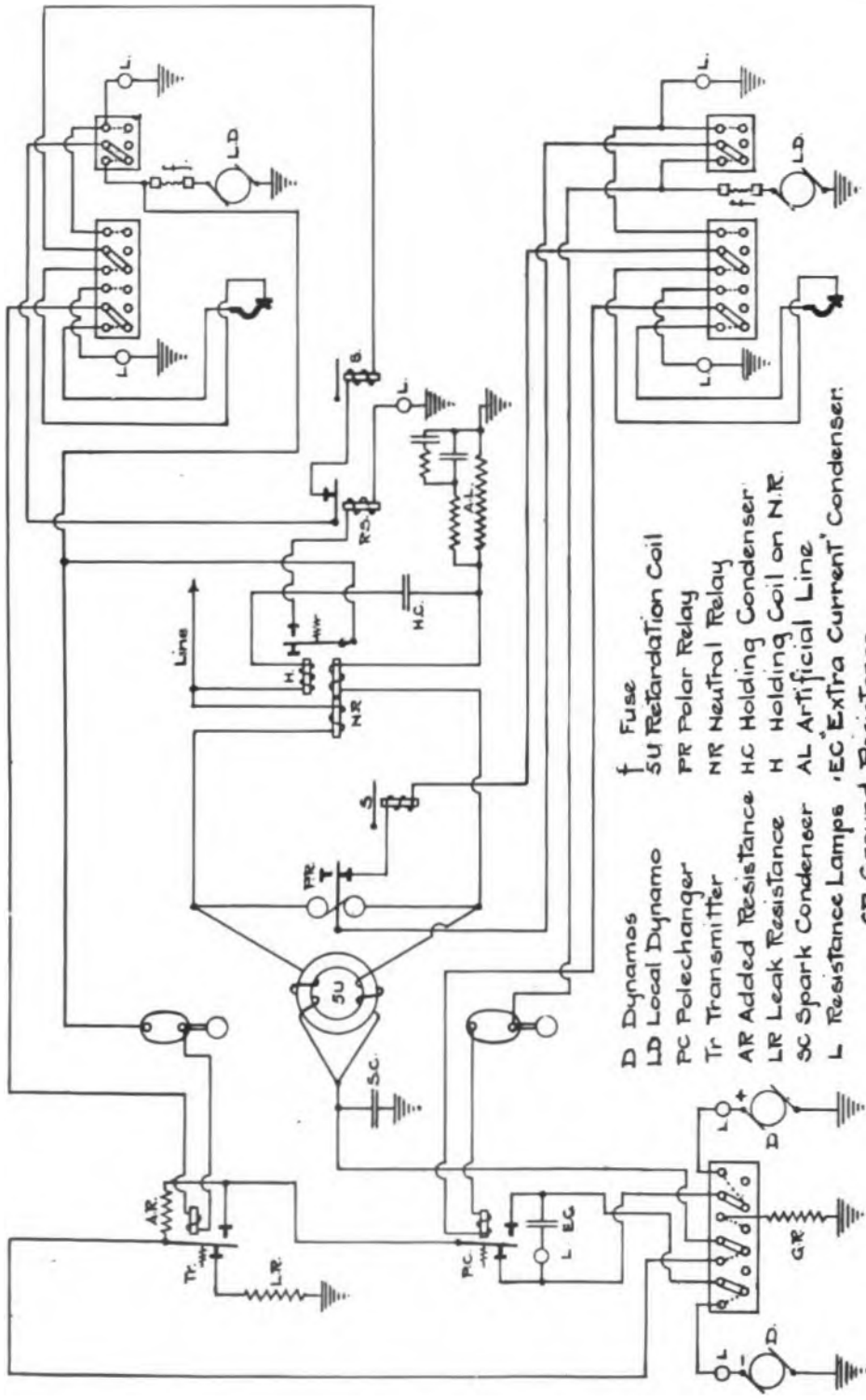

FIG. 4.—MAIN AND LOCAL CONNECTIONS OF QUADRUPLEX.

The absence of inductance in any circuit causes the current that flows therein to attain its maximum and zero values very abruptly at the making and breaking of battery contact, producing what is known as the "square top" form of wave, which gives rise to inductive effects more or less prejudicial to the operation of neighboring lines. On the other hand, the inductance present in a circuit tends to round off or graduate the rise and fall of the cur-

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rent, which is the kind least calculated to create inductive interference, and for the particular development of which, the 5-U coil is employed to considerable advantage.

It is, however, in connection with the operation of the auxiliary or holding coil (which it will be remembered holds the neutral relay closed during the interval of "no magnetism" therein) that the 5-U coil is particularly beneficial in quadruplex working, inasmuch as its magnetic discharge is not only utilized to energize the holding coil, but owing to the gradual manner in which the closed core parts with its magnetism, the discharge current is lengthened out or prolonged, and is thus enabled to act upon the neutral relay armature for a period of time more nearly corresponding with that represented by the "interval of no current" at the distant pole-changer.

It may be further remarked that the 5-U coil plays an important part in connection with the operation of the polar relay, whose armature movements are accelerated by the impetus derived from the induced currents set up in the impedance coil, the said currents taking such directions through the relay windings as to correspond with those of the signaling impulses.

(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.]

(25) Q. By what means is the "hardness" imparted to hard-drawn copper wire? C. W.

A. Simply by the mechanical process of drawing the copper through the dies to obtain wire of the proper gauge. From this it is evident that the hardness is largely on the surface.

(26) Q. Will you please tell a novice what is the difference between a direct current and an alternating current? O. T. S.

A. The character of different currents was treated on page 9 of our issue of January 1, under the head of "Standard Definitions of Electrical Terms." Much other information on electrical terms, etc., will be found in that article.

(27) Q. What is the difference between electrostatic induction and electromagnetic induction? W. D. H.

A. 1.—Electrostatic induction is the effect of bringing an electrified body near to an insulated conductor. The electricity on the charged body acts across the dielectric (air) and attracts the opposite electricity to the side of the conductor near the electrified body, and repels the same kind of electricity to the side remote from it. 2.—Electromagnetic induction is produced by the action of electric current in a coil of wire, or by the action of a permanent magnet or an electromagnet upon an adjacent closed circuit. Electrostatic induction does not involve wires at all, while electromagnetic induction does. The one involves electricity at rest (static); the other, electricity in motion (dynamic).

Correction.—In the answer given to question 18 in the March 1 issue, a decimal point at the wrong end of a group of figures gave a value the reverse of what it should have been. The part of the answer affected by the error should have read: "A milliampere is equal to one one-thousandth of an ampere, therefore .5 ampere expressed in milliamperes is 500. The answer is five hundred milliamperes, not five-tenths of a milliampere." Stated another way, one ampere equals 1,000 milliamperes, therefore half of an ampere (.5) must equal half of one thousand, which is five hundred.

The Turner Monument Fund.

Mr. E. P. Griffith, superintendent of telegraph of the Erie Railroad, New York, chairman of the Turner Monument Fund, is making every effort to interest all railway men in the movement. It is the ambition of the committee to close the matter at the earliest possible date, and show the people of the country how earnestly and readily railroad and telegraph men can carry to completion an undertaking of this character and magnitude. It is the intention to present to each subscriber to the fund a souvenir of the dedication which will be well worth preserving. Mr. Griffith's efforts should be encouraged and supported by all railroad men.

In the autumn of 1851, Charles Minot, general superintendent of the Erie Railroad, sent from Turner, N. Y., the first telegraph train order, and it is the purpose to commemorate this interesting and historical event by erecting a monument at that place. The following named gentlemen constitute the committee in charge of the monument fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

The contributions received up to date amount to $974.25.

The individual subscriptions received since the acknowledgment printed in the March 1 issue will be recorded in the issue of April 1.

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A Pathetic Use of the Morse Alphabet.

BY J. W. HAYES, OF PORTLAND, ORE.

It was about the year 1870 that a handsome, young Canadian applied for a position to Mr. Charles R. Hosmer, then manager of the Dominion Telegraph Company at Buffalo, N. Y. The name of this youth was George Edwin Millar. Like most of our Canadian brothers, Millar was an expert operator and quite a polished young fellow. He could sing well, write very fair verses, and was an entertainer in a small way. He worked in Syracuse, New York city, Philadelphia, Washington, Chicago and St. Louis.

It was at the last named place, in 1876, that I first met him. He was then working for the Atlantic & Pacific Telegraph Company as day operator, with Mr. W. H. Spencer as operator at the Merchants' Exchange, Mr. C. W. Hammond as manager, and myself, night operator, this being the full staff of the "opposition" in 1876 in St. Louis. Millar had developed into a man of ample proportions, fine business capacity, and one of the biggest hearted men in the State.

In the course of time I came West and Millar soon followed, being appointed manager for the Atlantic & Pacific Company at Pioche, Nev., then a wonderfully prosperous mining town. Later, Millar accepted the position of manager for the Western Union at Austin, Nev., where he was afterward elected to the Nevada Legislature. Some time after, he came to California, where he obtained a position with a large importing house for whom he traveled for twenty years, being regarded as the most popular commercial traveler on the Coast. On a trip to Arizona about 1900 he suffered a sunstroke from the physical effects of which he recovered, but the shock weakened his intellect quite materially and he was forced to resign his position. With nothing that he could do to earn a livelihood his mind appeared to turn to me and he came to Portland, where he lived till a year ago. He could telegraph as well as ever, but he lacked application and continuity of thought, and he would sooner do a messenger boy's labor than anything else and it was this calling that he followed for seven or eight years. Getting mixed up in a crowded street one day he was knocked down by a passing car and received severe injuries. These injuries deprived him of his hearing and partially of his sight, and here it is that the Morse code played a pathetic part.

I called to see my old friend at the hospital and found him cheerful, but unable to see or hear very much. Communication between individuals bereft as he was of these senses is not an easy matter. A thought struck me and seizing his hand I tapped with my finger in the Morse alphabet:

"How do you get me, George?"

"Oh, that's good stuff; tell me the news."

I tapped off what interesting items I had at my command and he was all attention, asking me later to read to him out of the *Oregonian*.

As I, too, am not able to see, my escort was called upon to do the reading. As he read to me, I ticked the news to Millar on his hand, using Phillip's code, with which he was familiar. He would "bk, bk" occasionally, and get off some witticism for which he was noted in former years.

I enjoyed these visits and we were certainly a puzzle to the doctors and nurses, who required demonstrative proofs of this transmission of intelligence before they could believe it.

Millar lingered for several months, but one day I was hurriedly summoned to his bedside. Taking my hand in his he feebly telegraphed me as follows:

"I'm gg home, Jef. Pls remember me to all t old boys wn u cn. Gd by."

His hand dropped from mine. The spirit of George Edwin Millar had gone to meet his Creator.

New Book on the Telephone.

Telephonology, by H. R. Van Deventer, is one of the latest and best books published on the telephone and on account of its practical character will appeal to all engaged in telephone work. The book is divided into sixteen chapters upon the following subjects; first principles, talking equipment; signaling equipment; commercial talking equipment: magneto instruments and circuits, magneto switchboards; selective and lock-out systems; batteries; testing telephone parts; testing equipment and fault location; measuring instruments and their uses; common battery equipment; harmonic party line systems; line and cable construction; the automatic system; composite systems and wireless telephony.

The author very wisely refrains from attempting to give any history of the development of the telephone, but after a brief discussion of the general subject of telephony, devotes the remainder of his book to describing apparatus, systems and methods in common use at the present time.

The chapter upon composite systems is probably the best and most concise exposition of this question of such importance at the present time to both telegraph and telephone people, that has ever been produced, being, in fact, the first general discussion of this subject which has ever appeared in any work on telephony. This chapter is well illustrated with circuit diagrams, showing the various combinations of apparatus which can be used to secure composite and phantom circuits. These are but a few of the many points contained therein which make the work a valuable one to the engineer or student. Copies of Telephonology may be obtained by addressing Telegraph and Telephone Age, 253 Broadway, N. Y. Price $4.00.

Mr. L. H. Jordon, manager of the Western Union Telegraph Company, Pittsfield, Mass., in renewing his subscription writes: "I felt as if I had lost a member of the family while I was without your paper."

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Among Our Advertisers.

"Okonite" is an electrical household word. It came into being with the electric light and the telephone and has been as steadfast and enduring. Okonite wire is now standard and is used for all electrical purposes and the well-known trade mark of the Okonite Company is seen wherever two or three electrical men are gathered together for business purposes. Captain Willard L. Candee is still at the head of the company. He has been at the helm ever since the company was organized and will probably be found there for a long time to come. He has built up a business and a reputation for this company that are rarely excelled these days. Mr. Candee is prominent in social life in Brooklyn, where he resides, and in business circles is widely known. He is a member of various prominent clubs and takes much interest in their affairs.

The catalogue of a large electrical supply house is an interesting book to look through, and if it is generously illustrated it gives one an idea at a glance of the almost infinite variety of instruments, supplies, etc., that a modern supply house must be prepared to deliver. The new catalogue of the old and well-known electrical supply house of J. H. Bunnell & Company, 20 Park Place, New York, is a book of this kind. It contains 210 pages, and almost every page excepting the index pages, has at least one illustration. Every instrument and device handled by the firm is concisely described, so that an intending purchaser can know the characteristic features of the instruments he wants. The catalogue is strongly bound and is intended for wear and service. The firm keeps abreast of the times in all things.

The American Telegraph Typewriter Company, 27 William Street, New York, has completed a large factory in Brooklyn, and is now manufacturing its instruments in lots of a thousand. The company expects to be in a position to make deliveries in a week or two. This instrument will fill an important place in telegraphy of the future, and will find a very wide field of utility on railroads and among press associations, industrial concerns, etc. Many railroads have already ordered equipment and the United States government will use the machines in various services. The instrument is remarkably compact in construction and the speed of transmission is limited only to the ability of the operator to manipulate the keyboard. Dr. G. A. Cardwell of New York is the inventor of this instrument and is president of the company.

The Friendly testing bridge made by Messrs. W. & L. E. Gurley, Troy, N. Y., is sustaining the claims made for it by the manufacturers. In a recent communication an official of one of the companies writes as follows regarding this testing set: "I have had the instrument at my office and made some tests and have arranged to make other tests. Only one case of actual trouble has been measured and the fault was located within one-half mile. The instrument is exceedingly well made and possesses some excellent features that I have never seen in a Wheatstone bridge. The manufacturers, Messrs. W. & L. E. Gurley, are an old and thoroughly reliable firm, and if the present instrument is not all that it should be, I am sure that they stand ready to make it so."

Harmonic Selective Telephone Systems.—Bulletin No. 1016, entitled "Harmonic Selective Systems for Party Lines," has just been issued by the Western Electric Company. It contains a description in detail of the principle of operation of harmonic systems and a number of diagrams are shown to illustrate the application of harmonic apparatus and the advantages of this system.

Moisture-Proof Telephone Cords for Railway Telephones.—A new line of telephone cords designed especially to meet the severe conditions common to railroad work has been developed by the Western Electric Company. The construction of these new cords is different from that of the standard cords now in use, the most radical change being that the insulation of each conductor is treated with a moisture-proof compound and that each conductor in those cords, which are subjected to the greatest wear, is reinforced with copper wires. This construction insures a flexible, moisture-proof cord, with long life and increased strength throughout. These cords are made in standard lengths, consisting of one, two, three and four conductors for use as receiver, transmitter and extension cords in connection with the various types of desk stands, transmitter arms and flexiphones.

Black Enameled Magnet Wire.

Black enameled wire is now offered to the market by the Western Electric Company and has been tested under the severest conditions. It is claimed for this wire that while the black enameled insulation is only .0002 inches to .0004 inches in thickness, it is so elastic that when the wire is stretched to the breaking point, the enameled insulation does not break until the wire itself gives way. It is stated that it will withstand indefinitely the ordinary atmospheric corrosives and the severe atmospheric conditions of shops, factories, tropical climates and the sea coast. It is not injured by exposure to temperatures of 250° F., a temperature which will destroy the tensile strength of cotton or silk in a few hours. It cannot be removed from the wire by the ordinary solvents, and the wire can be handled as easily and successfully as a silk insulated wire.

One of the great advantages possessed by black enameled wire is its small diameter as compared with that of single silk or cotton insulated wire. The winding space (for a specified number of turns) saved by black enameled wire over single silk No. 34 B. & S. wire is 25 per cent.

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Insulated Wires and Cables

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

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

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

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

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

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

KERITE INSULATED WIRE AND CABLE COMPANY

INCORPORATED BY W. R. BRIXEY

Sole Manufacturer

Hudson Terminal, 30 Church St.

NEW YORK

Western Representative

WATSON INSULATED WIRE CO.

Railway Exchange, CHICAGO, ILL.

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The Railroad.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., was also a recent New York visitor.

Mr. Wm. J. Camp, electrical engineer of the Canadian Pacific Railway Company's Telegraphs, Montreal, Que., was a recent New York business visitor.

Mr. R. L. Stultz for six years manager of the Alexandria, Va., office of the Western Union Telegraph Company, has resigned to accept a position in the telegraph department of the Southern Railway at Washington, D. C.

Mr. S. H. Anderson, Los Angeles, Cal., is electrical engineer of the Pacific Electric Railway Company, which operates 1,000 miles of road out of Los Angeles. Mr. C. M. Warnecke is assistant electrical engineer of the same road.

Mr. H. H. Morris, superintendent of the Huntington Division of the Chesapeake and Ohio Railroad, at Huntington, W. Va., was formerly a telegraph operator on that road and afterwards occupied higher positions. He was born in April, 1873.

Mr. A. E. Roome, formerly superintendent of telegraph of the Southern Pacific Company, has been appointed superintendent of telegraph, telephones and signals of the Pacific Electric Railway, with headquarters at Los Angeles, Cal. The railway lines of this company comprise 1,000 miles of standard gauge track.

Meeting of Railway Signal Association.—The stated meeting of the Railway Signal Association will be held at the Congress Hotel, Chicago, March 20.

Telephone Train Despatching in the Copper Region.—Telephone train despatching has been substituted for the telegraph on the Copper Range Railroad in Michigan. Mr. W. A. Rankin, Houghton, Mich., is chief electrical engineer of the Copper Range Consolidated Company.

Meeting of Eastern Division of Railway Telegraph Superintendents.—The regular meeting of the Eastern Division of the Association of Railway Telegraph Superintendents will be held in the committee room of the Washington Terminal Railway, Washington, D. C., at 11 a. m., Wednesday, March 22. The minutes of the meeting of the Western Division and other matters of importance will be discussed. Mr. Charles Selden, superintendent of telegraph, Baltimore & Ohio Railroad, Baltimore, Md., is chairman of the Eastern Division.

Boston Meeting of the Railway Telegraph Superintendents.

As the time approaches for the next annual meeting of the Association of Railway Telegraph Superintendents, which is to be held in Boston, June 19 to 23, arrangements are assuming definite shape. The entertainment features of the meeting will be of unusual interest. Mr. S. A. D. Forristall, superintendent of telegraph of the Boston and Maine Railroad, Boston, writes us as follows: "The Boston and Maine Railroad has kindly tendered the telegraph superintendents a special train to some point of interest on its lines, possibly Old Orchard Beach or Lake Winnipesaukee, on some day that will be agreeable to the Association. The New England Telephone & Telegraph Company has also tendered the ladies and such of the members as desire, an automobile ride through Boston's beautiful suburbs and nearby points of interest. I expect to arrange for an evening at the 'Pop' concerts. These concerts are given by members of the Boston Symphony Orchestra, one of the leading musical organizations of the world. This will give the people attending the convention an opportunity to listen to a very high order of entertainment. I am also trying to arrange for a harbor trip and a shore dinner at some point."

Breakage of Glass Insulators.

At the meeting in New York last November of the members of the Eastern Division of the Association of Railway Telegraph Superintendents Mr. W. J. Camp, electrical engineer of the Canadian Pacific Railway Telegraphs, brought up the subject of breakage of glass insulators, stating that many of them used on his lines broke into pieces without any apparent cause. There seem to be differences of opinion as to the reason for this. The general belief is, however, that it may be found in the incomplete annealing of the glass.

Mr. D. C. Hemingray, secretary of the Hemingray Glass Co., Covington, Ky., thinks that the abnormal breakage may be due to imperfect annealing. In regard to Hemingray insulators he says: "Our insulators after coming from the ovens are placed in the open air, where they are subject to all changes of climate for many days before they are packed ready for shipment. If by chance any of the insulators are not properly annealed, they will go to pieces in the yard."

Mr. W. E. Athearn, engineer of equipment, Western Union Telegraph Company, states that he has not experienced any unusual breakage of glass insulators. When they are placed on steel pins the pins are first fitted with a wooden cap and the insulators are screwed on the wood.

Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York, stated that though he had had no personal experience in the matter his attention had been called to many instances where glass insulators went to pieces from no apparent cause. He stated that it was well known among steam engineers that when steam gauge glasses were brought into contact with iron or steel they frequently flew into pieces and he had not been able to find a reason for it. He thought that possibly glass insulators on steel pins were affected in a similar manner.

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The Telephone.

Mrs. Sarah F. Glass, wife of Mr. Louis Glass, vice-president of the Pacific Telephone and Telegraph Company, San Francisco, died on February 3.

Mr. Charles Kinyon, formerly manager of the Davenport, Iowa, office, and recently with the telegraph interests at Kansas City, has accepted a position with the American Telephone and Telegraph Company at Oklahoma City, Okla.

Mr. L. C. Steele, circuit chief of the Michigan State Telephone Company at Detroit, has resigned to enter other business. He is succeeded by Mr. D. G. Williams, of the American Telephone and Telegraph Company, Indianapolis, Ind.

Mr. S. A. Jackson, chief test board man of the American Telephone and Telegraph Company at Detroit, Mich., has been transferred to a like position at Beaver Dam, Ohio. Mr. L. M. Shoppart, from Maumee, Ohio, succeeds Mr. Jackson at Detroit.

Mr. E. W. Moister, assistant controller of the American Telephone and Telegraph Company, New York, has been attached to the office of the controller, Mr. Charles G. DuBois. Mr. F. L. Devereux has been appointed auditor to succeed Mr. Moister.

Mr. Thomas D. Lockwood, general patent attorney of the American Telephone and Telegraph Company, Boston, and an old-time telegrapher, has returned from Bermuda much improved in health. He will rest during the month of March, before resuming his duties in Boston.

Telephone Penalty Suits Dismissed.—The Mississippi Supreme Court has dismissed penalty suits aggregating $1,100,000 filed against the Cumberland Telephone and Telegraph Company, in the Chancery Court of Prentice County, alleging violation of the anti-trust law. The company's victory is based upon the question of jurisdiction, the Supreme Court holding that the anti-trust statutes do not apply to complaints of this character.

New York Telephone Earnings.—The report of the New York Telephone Company for the year ended December 31 shows revenue of $36,353,899, and expenses, including depreciation and taxes, amounting to $25,734,733, which left net earnings of $10,619,165. Dividends and interest earnings amounted to $3,840,604, and miscellaneous earnings to $36,944. These brought the total net earnings up to $14,496,714. Interest charges of $2,150,714 and dividends of $8,712,488 were paid, leaving a surplus of $3,633,512.

Telephone Rates in New York.—Mr. Union N. Bethell, president of the New York Telephone Company, appeared before the New York Public Service Commission, second district, on February 24, and gave his reasons against reducing telephone rates between Manhattan and Brooklyn boroughs. He stated that the New York Telephone Company in seeking to avoid competition was trying to render competition unnecessary by giving the most adequate and most efficient service that money and men can create.

General Grant in Error on Telephone Matters.—The recent complaint of Major-General F. D. Grant, U. S. A., to the Public Service Commission, against the New York Telephone Company asking that the New York Telephone Company be required to furnish trunk line service to army posts' telephone switchboards on military reservations in this State, has been dropped. General Grant has written the Commission that he now finds that it is a question which concerns the War Department and the Department of Justice and it is improper for him to take action in relation to the matter.

Organization of Telephone Pioneers of America. Sixty-seven signatures have been obtained for the formation of the proposed organization of the Telephone Pioneers of America. The tentative requirements are "employment in the telephone service twenty-five years prior to date of application and continuously at any time thereafter for five years." The rosters are still in circulation and many names have been registered that do not appear on the list referred to. Letters of application may be forwarded to Mr. Henry W. Pope, American Telephone and Telegraph Company, 15 Dey Street, New York.

Telephone Communication with Moving Trains.—A system of telephony between moving trains and signal boxes, has been invented by Mr. H. V. Kramer in England. The apparatus consists mainly of a coil of wire wound round a railway coach, connected with the telephone instruments, and a wire laid alongside the track, connected with instruments at stations and signal boxes. Communication is effected by induction between the coil and the wire along the track. A buzzer can also be installed on each train, which automatically warns the engineer of the presence of another train on the same line within a radius of five or ten miles. The system is to be tested on one of the English roads.

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, at which were present telephone men from Rockland County, New York City and New Jersey. Covers were laid for 175 persons.

Mr. G. L. Yates, of Mount Vernon, division superintendent of traffic, acted as toastmaster. The speakers were Mr. Herbert N. Casson; Mr. H. F. Thurber, vice-president and general manager New York Telephone Company; Mr. George C. Allen, general plant superintendent; Mr. D. C. Cox, division manager, Long Island; Mr. W. F. Judson, special agent legal department, New York; Mr. H. G. Kerr, division commercial man-

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ager, Westchester, and Mr. W. J. Clark, vice-president Westchester Lighting Company.

A very enjoyable time was had by all present. Mr. Thurber's remarks were reminiscent in character and created a general good feeling.

Buoy Telephone.—The use of the buoy telephone with which submarine vessels are equipped for communicating with the surface in case of accidental sinking was well demonstrated recently, when a German submarine torpedo boat sank in Kiel harbor. The buoy float was automatically released and rose to the surface, where the life-saving crew made connection with it and learned from the captain of the submarine that his stock of oxygen would support the twenty-five men of the crew for forty-eight hours. Careful preparations were then made for raising the submarine, and in three hours the submerged vessel was brought to the surface. Mr. Jesse Sims, Maynard, Mass., claims to be the inventor of this buoy telephone. He submitted prints of his invention to the various European governments and the device was being tested by the German government when the practical utility of the instrument was unexpectedly demonstrated in the manner stated.

Telephone Extensions in Southwest.—The directors of the Colorado Telephone Company have authorized the sale of $1,500,000 of its capital stock, the proceeds to be used in refunding loans and to meet the cost of extensions in Colorado, New Mexico, Texas and Arizona.

Public Service Commission Approves Telephone Mergers.

The New York Public Service Commission, Second District, has authorized the transfer by merger to the New York Telephone Company of all the property and rights of the Jefferson County Telephone Company, also all the property and rights of the Trumansburg Citizens' Telephone Company.

The Commission has also approved of the transfer by the New York Telephone Company to the Allegany County Telephone Company of franchises or rights granted to the New York and Pennsylvania Telephone and Telegraph Company by the board of trustees of the villages of Wellsville and Andover. The Commission holds in this case that the consent of the Commission is not required for the transfer of the physical properties.

The Commission has dismissed the joint petition of the Amsterdam Automatic Telephone Company and the New York Telephone Company for the approval of the transfer of the real estate, physical plant and property of the Amsterdam Automatic Telephone Company to the New York Telephone Company. The Commission holds that it has no power or jurisdiction to consent to or forbid the transfer of the physical property of one telephone company to another, its power being limited to controlling the transfer of franchises from one such company to another.

The transfer by the New York Telephone Company to the Otsego and Delaware Telephone Company of certain franchises or rights of the Central New York Telephone and Telegraph Company assigned to the New York Telephone Company in the city of Oneonta, villages of Unadilla, Laurens, Cooperstown and Richfield Springs and village of Walton, has been approved by the Commission. The sum of $98,000 was paid for that property and rights conveyed. The Commission holds that its approval of the transfer of the physical properties was not required by the Public Service Commissions Law, and has dismissed the joint petition of these companies so far as it relates to the approval of the transfer of the physical properties.

No Destruction of Poles by Woodpeckers on Pacific Coast.

Mr. R. W. Gray, division plant superintendent, Western Union Telegraph Company, San Francisco, Cal.: "I do not know of there having been very much trouble on the Pacific Coast from woodpeckers destroying poles; the only cases being in California, and in certain very limited areas, and the damage has been to redwood poles only. The redwood poles are very soft and very easy 'pecking.' The places where the damage by woodpeckers has occurred have been in parts of the country where there were considerable groves of live oak trees. There is a large woodpecker known as the "Flicker," which lives in the oak trees and whose chief vocation in life is digging grubs and insects out of the bark of the oak trees. It seems that occasionally he alights on one of the redwood poles and does a few stunts to it, merely in a spirit of frivolity, rather than with any definite purpose in view. The remedy adopted in these cases was to substitute western cedar poles in place of the redwood. We have never known of any damage being done to cedar poles by woodpeckers. We can readily understand how the woodpeckers in Mexico, who are used to a diet of mesquite, palo verde, cholla and ocotilla, would esteem a nicely seasoned, creosoted cedar pole a great delicacy. However, the California woodpeckers are much better brought up, and will not have anything to do with a cedar pole. We have experienced a small amount of trouble in the Yuma Desert, due to the drifting sand wearing away poles. This was limited in extent, however, and not particularly serious. Poles in California, Arizona and Nevada never deteriorate above the ground; they rot at and below the ground line. In Oregon and Washington, in the western part of the states, where the rainfall is very great, poles rot at and below the ground line, and the entire pole deteriorates from decay, the life of the pole above the ground being six or eight years longer than that of the part below the ground."

Every one connected with the telegraph and telephone services should read Telegraph and Telephone Age. Its columns contain the latest news in these fields.

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The United States Military Telegraph Corps.

The bill introduced in the recent 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, some of which were of great national importance. Representative Taylor of Ohio will reintroduce the bill in the House of Representatives at the extra session of the Sixty-second Congress, which will convene on April 4.

In our issue of January 16 was published the text of a letter to President Taft from Col. W. B. Wilson, president of the Society of the United States Military Telegraph Corps, urging the President to use his influence in behalf of the bill.

Bronze Tablet in Soldiers Memorial Building at Pittsburg.

The design for this tablet in memory of the telegraphers from Allegheny County, Pa., who served in the United States Military Telegraph Corps during the Civil War is now completed and the tablet will, it is hoped, be finished in time to be unveiled on April 22, the fiftieth anniversary of the founding of the Corps. It is expected that Mr. Andrew Carnegie will be present at the unveiling. The committee having the matter in charge is composed of Mr. Andrew Carnegie, Mr. Joseph W. Boyd and Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps.

New Book.

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, diseases 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.

Bids Wanted for Government Supplies.

Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until 10 a. m., March 21, to furnish at the navy yard, Boston, Mass., a quantity of electrical cable as per schedule 3379. Blank proposals will be furnished upon application to the navy pay office, New York, or to the Bureau. T. J. Cowie, Paymaster-General, U. S. N.

Bids are also invited until 11:30 a. m., March 27 for supplies for the Signal Corps, U. S. A., Washington, D. C., as follows: bolts for cross arms, porcelain cleats, 1-ampere fuses, copper splicing sleeves, wire staples, condulets, wire grips, pliers, linemen's tool bags, insulators, telegraph keys, sounders, knife switches, torches, cross-arm braces, files, pikes, outlet boxes, coppers for gravity cells, crowfoot zincs, etc. Apply to A. S. Cowan, Captain Signal Corps, U. S. A., Washington, D. C.

Telephone Supplies Wanted for Signal Corps.—Proposals will be received at the office of the Chief Signal Officer, War Department, Washington, D. C., until 11 a. m., March 23, for a large quantity of electrical supplies, including lightning arresters, carbons for same, telephone induction coils, telephone cords, loud ringing extension bells, generators for artillery telephones, binding posts, magnetos, receivers, plugs, etc., etc. For further particulars address A. S. Cowan, Captain Signal Corps, U. S. A., disbursing officer, Washington, D. C.

Electric Clocks in Kansas Legislature.—Electrical self-winding clocks, controlled by Washington time, have been installed in both chambers of the Kansas legislature. It is pointed out that they will prevent the lengthening of the legislative day prior to adjournment. The legislators, however, know the art of wire pulling, now they ought to add the art of wire cutting. By cutting the wires just before noon the legislative day can be extended indefinitely.

Increasing Telegraph Facilities in Texas on Account of Mobilization of Troops.

The mobilization of United States troops in Texas along the Mexican border which is now being actively carried out will result in a heavy increase of telegraph business from that section. San Antonio and Galveston will be the principal centres of telegraphic activity and the Western Union Telegraph Company and the Postal Telegraph-Cable Company of Texas have made ample provision to increase the operating forces at these and other points where the sudden increase of business will require greater facilities for handling it. Government and newspaper correspondence promises to be of very large volume.

Time Signals in New York Harbor.—The subject of an official time signal for the benefit of the shipping interests in New York harbor is being discussed by shipping men, and the Hydrographic office. The Western Union time-ball served this purpose for many years, and is still doing duty, but it is not now visible from the harbor on account of the surrounding skyscrapers. It is proposed to place the new signal on top of the Whitehall Building, at Battery Park, which is the highest and most conspicuous structure in the lower part of the city.

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Death of David R. Downer.

David R. Downer, a prominent New York telegrapher many years ago, died at his home in East Orange, N. J., March 2, after an illness lasting two years. Mr. Downer was for some years assistant manager of the Western Union Telegraph Company at 145 Broadway and at 195 Broadway, after the removal from the old quarters at 145, his brother, the late A. S. Downer being manager. He resigned his position in April, 1884, to enter the gold and silver refining business in Newark, N. J. Mr. Downer was born in New York, November 15, 1839.

Obituary.

John Fitzpatrick, aged 78, a pioneer in telegraph circles in Springfield, Mass., died in that city recently. He built the first long distance telephone line between Springfield and Boston.

Alfred G. Trulan, aged 53, an operator in the service of the Western Union Telegraph Company at Montpelier, Vt., died on February 13.

Frank R. Wells, aged 49 years, an operator for the Western Union Telegraph Company, New York, died suddenly on a train while on his way to business on March 9.

Joseph Wetzler, well known several years ago in connection with electrical journalism in this country, died in London February 22. Mr. Wetzler was born in Hoboken, N. J., December 6, 1863. He was co-editor, with Mr. T. Commerford Martin, of the *Electrical Engineer* of New York, up to the time of its consolidation with the *Electrical World*, in 1899. He was a graduate of Stevens Institute and was a patron of the fine arts. Since his retirement from the journalistic field he devoted his entire time to the management of a correspondence school in electricity in England.

Samuel C. Suydam, aged 80 years, at one time a prominent Syracuse, N. Y., operator, died in that city on February 22.

Col. Josiah C. Reiff, aged 73 years, an old railroad financier, and known to the electrical fraternity on account of the financial aid extended by him to Mr. Thomas A. Edison during the latter's early career as an inventor, died in New York, February 28. Col. Reiff supplied Mr. Edison with funds to carry on his experiments and investigations which resulted in the automatic telegraph and the quadruplex. Col. Reiff was well-known to many old time telegraphers.

Charles W. Hennessy, aged 24, an operator in the Postal Telegraph-Cable Company's office at Oswego, N. Y., died in that place February 18.

Henry C. Rowell, aged 86 years, one of the oldest telegraphers in the Eastern States, died at his home in East Hanover, N. H., February 22.

Joseph Keenan, who, for about fifty years had charge of the construction department of the Western Union Telegraph Company at Toledo, Ohio, and who died some time ago, was well known in that branch of the service. He was one of the most expert line builders in the country, and carried on his work in a scientific manner. He was 70 years of age and practically his entire business career was spent in Toledo. He was a man of unusual ability, and highly respected. Under Mr. Keenan several well-known line constructors and repairers received their training and practical experience. Mr. Keenan was the father of Mr. Edwin C. Keenan, superintendent of telegraph of the Lake Shore and Michigan Southern Railroad Company.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

In the death of Joseph Knittle, which was recorded in the March 1 issue, the quartette of operators who worked the Phelps printers in this office for so many years has suffered its first loss by death. The three living members are Mr. Thomas P. Scully, Mr. John K. Calvert, and Mr. Joseph L. Edwards. All four were retired by the company in 1903 on the discontinuance of the printer system, after a service of almost fifty years. They were all held in high esteem by their Morse colleagues and were gentlemen of the old school. Mr. Scully's telegraph service goes back to the early fifties. He is therefore a veritable old-timer. He was president of the North Western Telegraph Company for many years. Mr. Calvert's service has been mainly as a printer operator. He began his career as a messenger for the Bain Chemical Telegraph Company at 29 Wall Street, New York, in 1851, and went with the House Printing Telegraph Company at 145 Broadway, in 1862. Mr. Edwards' experience also was mainly with printing telegraph companies. He was chief operator of the printing service at 145 Broadway and assistant editor of the *Telegrapher* in 1865. He was associated with the late G. M. Phelps in the invention of printing telegraph instruments.

George H. Schnitgen, aged 42 years, formerly of this office and a well known telegrapher, died on March 4, at his home at Clinton Corners, N. Y., to which place he had retired some time ago to engage in farming.

E. C. Rafford, a member of the Commercial News Department force, died of apoplexy on March 7. Mr. Rafford was a well known member of the profession and his sudden death is mourned by a host of friends.

THERE ARE NO REBUILT TYPEWRITERS equal to the "Central." Call and see them or write me personally. "Mills" rebuilt by high class workmen. Prices moderate. D. A. Mahoney, Representative, **CENTRAL TYPEWRITER EXCHANGE,** New York City.

PHILADELPHIA, POSTAL.

Night Traffic Chief W. P. Bowers has returned to duty.

Mr. Edward Fitzgerald has been appointed to the post of "rider" on the leased wires.

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The Postal Electric Club, under the guidance of Chief Operator E. W. Miller, is growing in favor. The three lectures given so far have been a success.

The Wright printing machine recently installed between New York and Philadelphia is doing excellent work under the supervision of Mr. Nelson.

ATLANTA, WESTERN UNION.

Mr. H. K. Griffin, whose appointment as chief operator of this office was announced in these columns March 1, succeeded Mr. E. Waldron. Mr. Griffin came from New York. Mr. Waldron was transferred to the position of night chief operator. Mr. J. F. Morey is all night chief operator and Mr. W. C. Hair day traffic chief. Mr. J. T. Goodrum has been recently transferred from day supervisor to night traffic chief, vice Mr. R. F. Williamson, who has left the service. Mr. O. T. Hughes is the all-night traffic chief. Mr. R. E. Satterwhite was recently appointed supervisor in the "way room," vice Mr. H. B. Smith. Mr. A. H. Condra, formerly night traffic chief, has been transferred to the plant department as general wire chief, days.

An electrical class has just been organized, with a membership of fifty-five. The class is made up of thirty-six men from the operating department, the remainder coming from the various division and district superintendents' offices. The first meeting was held in the office of Mr. D. M. Thorell, division traffic superintendent, on February 20. Mr. H. C. Worthen, general superintendent, gave the class a very interesting talk on the benefits of an electrical and general telegraphic education. Another meeting was held the following evening, at which Mr. Worthen gave a talk along the same lines but covering a wider range. The address was listened to with marked interest and created a feeling of enthusiasm for and appreciation of the importance of the work to be taken up by the class. The third meeting, at which the class began serious study was held in the evening of March 1. It was in charge of Professor Wood, of the Georgia School of Technology.

Owing to the heavy volume of business at Jacksonville, Fla., caused by the "tourists," the following named operators were recently sent there from this office: Messrs. J. W. Jones, E. P. Cox, L. T. Lester, L. Swartzburg, J. E. R. Stinson, D. J. Siegel, F. C. Connor, T. A. Smith, F. L. Maxler, J. A. Spencer, P. L. Nash, and Mr. LaChevrotiere.

Mr. E. Waldron, night chief operator, and Mr. J. F. Morey, all-night chief operator, of this office, have been transferred to the plant department. Mr. J. T. Goodrum, night general traffic chief, and Mr. O. T. Hughes, all-night general traffic chief, will be in charge of the traffic on their respective tricks.

PITTSBURG, WESTERN UNION.

Miss Hattie Richards, timekeeper and stenographer, employed in this office, died on February 14.

Commercial Association of Western Union Telegraph Company.—In our issue of March 1 we gave an account of the organization of the Greater New York Commercial Association of the Western Union Telegraph Company. Mr. J. W. McMahon, district commercial manager at 270 West 23rd Street, New York, was one of the speakers, but in the original account a clerical error gave Mr. McMahon the initials "P. J." that he never possessed.

Martin's Double Lever **VIBROPLEX**, $8.00 f. o. b. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

WANTED.—Live agents in all large Western Union and Postal offices. Central Typewriter Exchange, New York.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, combines fraternalism with sound business principles; it offers to the telegraph and telephone employe an absolutely safe form of protection, at a cost within the reach of all and lower than can be found elsewhere. Membership only open to employes in commercial or railroad telegraph or telephone service, and it is manifestly to the interest of those who are eligible and wish to secure life insurance within their means, to secure without delay a certificate for $1,000 or $500, or both, at rates based on present age.

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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.

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Telegraph and Telephone Age

No. 7. NEW YORK, APRIL 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY—XV.

BY WILLIS H. JONES.

The New Western Union Polechanger.

In discussing the admitted superiority of the new polechanger used in connection with the new Western Union quadruplex which will soon supersede the old standard, it is apparent that many laymen are somewhat perplexed as to its operation, and fail to fully understand just why the actions of two opposing magnets situated on opposite sides of a common lever armature do not interfere more or less with each other.

Others ask why the retractile spring of the relay should require aid in pulling the lever back. This is one of the strong points in the device after the contact points have once been broken. The lever armature is placed between the pole pieces of two opposing magnets, one of which is short and stumpy and acts quickly; the other is longer and larger, and is so constructed and connected as to make it act sluggishly. When the lever touches the front contact point one polarity of current goes to the line while the opposite polarity follows when the position of the lever is reversed.

Now the reason that there is no appreciable magnetic interference with the common control of the armature lever is that the two magnets act successively instead of simultaneously, and, furthermore, because their respective duties are performed and finished within a shorter period of time than the lever, unassisted, would otherwise occupy in its transit across the air gap between the two contact points. This is because magnetic action is much quicker than mechanical action.

In other words, with this arrangement we get, alternately, two separate magnetic actions on the armature while the retractile spring is occupied in performing its duty of opposing or assisting the lever across the air gap.

This brings up the question, "Why is it necessary to assist the retractile spring in withdrawing the lever?" The answer is, this: in order to accelerate the movement of the lever, it is advisable to use any method that will reduce the time thus occupied which time measures the duration of the period the battery is disconnected from the line during the reversals. The shorter this period is the nearer we come to obtaining the efficiency derived from the old style continuity-contact-preserving polechanger.

The reader will now probably perceive that the aim of this polechanger is to give the same efficiency of service as the continuity-contact-preserving pattern, not by actually bridging the gap but through its ability to annihilate time during the process of reversing polarities, while at the same time actually retaining the gap necessary to prevent excessive sparking. Its operation is as follows:

When the key in the local circuit is closed, both magnets, of course, become energized. But the stumpy magnet, which is a little closer to the armature than is the larger one, is so much quicker in action than the latter that it draws the lever over before the large magnet has "built up." By that time it is too late to interfere, but it is now "loaded," so to speak, and is ready to add its pull to that of the retractile spring the moment the lever starts back for the reversal. Of course, when the local circuit is opened both magnets become demagnetized. In this case, the delay of the large magnet in losing its energy is just long enough to enable it to pull the armature back quickly, as the tension of the spring is relaxing, before becoming entirely demagnetized. In thus shortening the period of transit, we practically diminish the width of the gap without actually altering its dimensions in the least. This fact was satisfactorily proved by comparing the dimensions of the spaces or breaks shown between marks recorded on a running tape when reversals of polarity were made rapidly, first by retractile spring energy alone and then by the combined method just described. It was found that no matter how rapidly the reversals were made by means of retractile spring energy alone the gap or space marks were invariably quite conspicuous between the black marks due to such reversals. But when the records made by the reversals of the new

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polechanger were examined, although the speed was not diminished, the gap was almost imperceptible to the eye.

With this positive evidence before us and the knowledge that the superiority of this polechanger over the old patterns is probably due solely to the diminished "time period" when the battery is disconnected from the circuit, the writer cannot miss this opportunity to again urge laymen to realize the importance of keeping the contact points of the old-pattern polechangers as close together as it is possible to work them without sparking. Every fraction of a second that can be gained by this means not only helps the operation of the apparatus at the other end but raises the general efficiency of the circuit. In all forms of energy, time is one of the factors with which we must reckon. This is especially true in connection with electrical energy.

Try the following experiment:

First: Connect, say, 300 volts to one brush of a solid metal ring which is being rapidly rotated and ground the other brush, as shown in the upper part of the accompanying illustration. You will then get 300 volts at X where the line is connected, because there is no break and no time is lost.

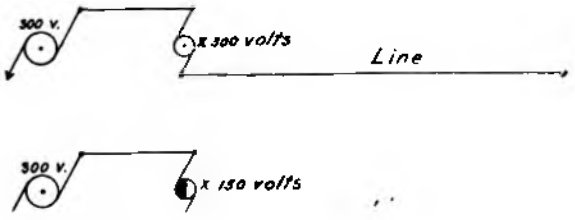

DIAGRAM SHOWING EFFECT OF SOLID AND HALF-SOLID RING IN CIRCUIT.

Second: Replace the solid disk with one of half metal and half rubber or glass, as shown in the lower part of the illustration. In this case a voltmeter will indicate only 150 volts at X because the energy is sustained only half of the time occupied by the disk in making one revolution. If the metallic and insulated parts of the disk are divided in any other proportion the value of the e.m.f. at X will be changed to correspond with the ratio of one to the other, in other words, it will rise or fall in accordance with the time the energy is sustained during one cycle.

This, illustration, of course, shows very marked variations in the alternations, but the fact that a break, due to an unnecessarily wide open pole changer, is comparatively small, should not mislead one to imagine that it is harmless. No matter how small the gap is it will diminish the electric energy and in multiplex operation there is little or no margin to work on. So keep the polechanger contact points closely adjusted.

Telegraph and Telephone Age is the oldest and most ably-conducted telegraph journal in America and should be read by every one engaged in telegraphy. Subscription price, $2 per year.

Recent Telegraph and Telephone Patents.

ISSUED FEBRUARY 21.

985,021. Antiseptic Telephone Mouthpiece. To W. M. English, Sausalito; L. E. Boukofsky and S. M. Lichtenstein, San Francisco, Cal.

ISSUED FEBRUARY 28.

985,120. Telephone Instrument. To W. Aitken, Liverpool, Eng.

985,127. Portable Telephone Pole. To G. J. Bayless, Oakland, Cal.

985,169. Telephone Transmitting Cut-out. To C. M. Hartnett, Malden, Mass.

985,186. Telephone System. To O. M. Leich, Genoa, Ill.

985,233. Printing Telegraph. To J. J. Vermeer, Oakland, Cal.

985,638. Telephone Mouthpiece. To L. Steinberger, New York.

985,680 and 985,760. Telegraphic Receiving Organism. To I. Kitsee, Philadelphia.

985,820. Party-Line Ringing Key To R. H. Manson, Elyria, Ohio.

985,899. Automatic Telephone Selector or Ringing Device. To R. R. Hobbs, Louisville, Ky.

986,260. Selective Lockout Telephone System. To F. W. Adsit, St. Paul, Minn.

986,267. Telephone Signal. To C. L. Chisholm, Marysville, N. B., Can.

The following patents have expired:

515,797. Telephone Receiver. Issued to Charles Selden, Baltimore, Md.

515,845. Telegraph Repeater. Issued to W. E. Sloan, Chicago, Ill.

515,939. Telephone Exchange System. Issued to E. Pope, Quebec, Can.

515,940. Telephone System. Issued to E. Pope, Quebec, Can.

516,506. Interior Telephone System. Issued to Thomas McCoubray, New York.

516,552. Telegraph Apparatus. Issued to Josiah A. Parker, St. Louis, Mo.

Personals.

Mr. N. J. Cornell, of the Western Union Telegraph Company, Portland, Ore., is now at Goshen, Ind., on sick leave.

Mr. C. A. Tinker, former general superintendent, Western Union Telegraph Company, New York, is visiting his daughter, Mrs. W. Tracy Smith, at Empalme, Sonora, Mexico.

Mr. F. N. Bassett, a well-known old-time telegrapher and for some years assistant general manager of the United Press, is now managing the Highland House at Pinebluff, N. C. The hotel is located in the midst of the pines, and is conducted in a home-like manner.

Mr. Robert O. Bailey, the new assistant secretary of the United States Treasury, began his business life as a messenger for the Western Union Telegraph Company in Chicago. He later entered the printing business and became a reporter. He was afterwards connected with the Associated Press.

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Mrs. Theo. N. Vail, wife of president Mr. Theo. N. aVil of the American Telephone and Telegraph Company and the Western Union Telegraph Company, returned from Europe on the steamer *Oceanic* on March 22.

Fishing in Florida.—Mr. George M. Myers, of Kansas City, Mo., a well-known old-time telegrapher, president of the Priests of Pallas and president of the Kansas City Aero Club, has been spending some time in Florida fishing. Florida is the Mecca of fishermen and many telegraph men go there to indulge in their favorite sport. Mr. Myers and his party are having excellent catches.

Mr. Gano Dunn, formerly a telegrapher and now chief engineer of the Crocker-Wheeler Company, Ampere, N. J., stands at the head of the list of nominees for president of the American Institute of Electrical Engineers. In a canvass of the membership he received 993 votes, the next highest being 590. Mr. Dunn's election to this high position is therefore practically assured.

Mr. D. G. Ramsay, an old-time telegrapher and a member of the Old-Time Telegraphers and Historical Association, is a candidate for judge of the Circuit Court of Cook County, Chicago. Mr. Ramsay has served a term in the Illinois legislature. He began his business career as a telegrapher and was for three years president of the Order of Railway Telegraphers. Later he became assistant cashier of the East St. Louis (Ill.) National Bank. During the three years that he occupied this position he studied law and was admitted to the bar. He began the practice of law in Chicago in 1888. Mr. Ramsay is an eloquent and forcible speaker.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay, president, and Mr. C. C. Adams, second vice-president, have returned to their offices after a short inspection trip in the South.

Mr. H. A. Tuttle, president of the North American Telegraph Company, Minneapolis, Minn., was a recent New York visitor on company business. He was accompanied by Mrs. Tuttle.

Mr. George H. Usher, general superintendent, Mr. Jesse Hargrave, division superintendent, and Mr. C. B. Arrington, district superintendent, Atlanta, Ga., were in New Orleans recently on a tour of inspection. The New Orleans office is to be enlarged.

Mr. John Doran, superintendent of the complaint and claim department, has been ill with an affection of the eyes, but is now back at his office.

Mr. Lewis MacConnach, a clerk in the office of the vice-president and general manager, was married March 22 to Miss Dorothy Elizabeth Pettit, of Brooklyn, N. Y.

Mr. D. H. Gage, Jr., of the electrical engineer's office, has gone to Oklahoma City, Okla., to assist in planning and equipping new offices in Mr. F. W. Conger's division.

Mr. C. F. Printz, of the Cincinnati office, has been appointed to a position in the division electrical engineer's office of this company at Chicago.

Mr. C. F. Leonard, district superintendent, New York, announces the following appointments and changes:

The office at 157 East 125th Street, will on May 1 be removed to 163 East 125th Street. Manager S. Cohen of the office at 1947 Broadway has been transferred to the 228 Pearl Street office as manager and has been succeeded at 1947 Broadway by Mr. E. T. Flannagan. The district at 1397 Broadway, covered by manager C. A. Francis, has been divided, the lower section being assigned to the management of Mr. Francis and the upper part to that of Mr. T. J. McQuillan, with headquarters at 1566 Broadway. Mr. Francis' district will now cover the section from thirty-fifth Street and Broadway to Forty-second Street and that of Mr. McQuillan from Forty-second Street to Fifty-third Street.

Mr. E. Kimmey, district superintendent, New York, has returned to his office after an inspection of offices in the States of New York and Vermont.

Mr. S. G. Fitch, manager of the Scranton, Pa., office, and Mr. J. W. Weed, manager of the Syracuse, N. Y., office, were recent New York visitors.

Annual Dinner.—The Postal Telegraph Club of Atlanta, Ga., will hold its annual dinner on April 22.

Mr. G. F. Fuller has been appointed manager of the Indianapolis, Ind., office, vice Mr. F. W. Samuels, retired.

Mr. E. A. Siferd, manager of the Postal Telegraph-Cable Company at Lima, Ohio, has resigned to engage in other business. He is succeeded by Mr. H. A. Thompson of the Zanesville, Ohio, office.

The Company has made the following awards of prizes for valuable suggestions in accordance with the offer of the company made in January, 1910; first prize $50, to Mr. M. W. Gotheld, manager, Greenville, Miss.; second, $45, to Mr. J. H. Dorsey, manager, Los Angeles, Cal.; third, $40 to Mr. C. M. Gaffney, manager, Greenville, S. C.; fourth, $35, to Mr. R. H. Hawkins, chief clerk to superintendent Black, Denver, Col.; fifth, $30 to Mr. G. H. Mills, manager, Providence, R. I.; sixth, $25 to Mr. C. C. Ramsay, manager, Portland, Me.; seventh, $25, to Mr. C. F. Thompson, chief operator, Washington, D. C.; eighth, $10 to Mr. A. G. Drake, assistant chief operator, Chicago, Ills.; ninth, $10 to Mr. R. H. Armstrong, manager, Richmond, Ind.: tenth, eleventh, twelfth, thirteenth, fourteenth and fifteenth,

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$5 each to Messrs. A. J. Mackler, operator, St. Louis, Mo.; Lewis McConnach, clerk, general manager's office, New York; R. A. Barton, manager, Lancaster, Pa.; O. F. Schultze, solicitor, Seattle, Wash.; J. H. Hennessy, manager Messenger Department, New York; A. J. Kavanaugh, chief service clerk, New York. Prizes will be awarded for valuable suggestions during the year 1911.

Telegraph Right of Way on Southern Pacific Railway.—The Court of Appeals in California has rendered a decision sustaining the right of the Postal Telegraph-Cable Company to condemn a right of way on the Southern Pacific Railroad, and has denied the application of the Western Union Telegraph Company for a writ of prohibition against such condemnation.

Magnetic Club Spring Dinner.

The Magnetic Club will hold its spring dinner at the St. Denis Hotel, New York, April 26. The editors of electrical papers published in New York have been invited to attend the dinner as guests of the club. An exceptionally fine entertainment programme is being prepared and a large attendance is expected.

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 spending a few days at Asheville, N. C. He was accompanied by his sister, Miss Vail, and his private secretary. He returned to New York on March 25.

Mr. G. D. Perry, general manager of the Great North Western Telegraph Company, Toronto, Ont., was a recent business visitor at the executive offices.

Mr. John C. Willever, secretary of the company, has returned to his office after a few days absence in Ocean City, N. J., whither he went to get rid of a cold. He was much benefited by his rest.

Mr. H. C. Worthen, general superintendent of the Southern Division at Atlanta, Ga., was in Key West, Fla., recently on company business.

Mr. C. H. Gaunt, general superintendent of this company at San Francisco, accompanied by Mrs. Gaunt, was a recent guest of Mr. Hugh McPhee, district commercial superintendent at Los Angeles, Cal. Mr. Gaunt is convalescing after an illness of typhoid fever.

Mr. W. A. Houghtaling, of New York, has been transferred from the traffic department to the department of the engineer of equipment.

Mr. Allan Woodle, manager at Boston, has been promoted to the position of district commercial manager of the first district, with headquarters at New Haven, Conn.

Mr. O. A. Conner, district commercial manager at Buffalo, has been appointed acting manager at Boston, Mass., vice Mr. Woodle.

Mr. S. M. Custer, district commercial manager for Connecticut at New Haven, goes to Philadelphia as district commercial manager.

Mr. H. A. Carrell, manager of the Macon, Ga., office has been appointed manager of the Savannah, Ga., office, vice W. B. Stuart.

Mr. F. M. Houser, of Jacksonville, Fla., has been appointed chief operator at Savannah, vice Joseph Marshall, transferred to Charleston, as chief operator.

Mr. J. T. Gray has been appointed manager at Columbia, S. C.

Mr. John W. Brown, manager of the Augusta, Ga., Western Union Telegraph office since October, 1902, has been retired on a pension. Mr. L. R. Daniel, of the Columbia, S. C., office will succeed Mr. Brown. Mr. Brown was born on April 29, 1847, and entered the telegraph service on December 1, 1859. He is one of the best known figures in telegraph circles in the South.

Mr. Harman D. Jones, chief clerk in the office of the general superintendent at San Francisco, Cal., has been appointed special agent for the first district of the Pacific Division with headquarters at San Francisco, Cal.

Mr. G. H. Boothby chief solicitor at Philadelphia has been transferred to Boston as chief solicitor.

Mr. Edward Schrader Ridgway, chief operator of the Memphis, Tenn., Western Union office, was born in Union City, Tenn., March 7, 1885, and entered the telegraph service in Nashville, Tenn., January 7, 1900, where he remained without interruption until November 16, 1910, when he was appointed to his present position. He was repeater chief in Nashville in 1908, and chief and night chief operator in 1909.

Mr. O. L. Michaels, manager of the Colorado Springs, Col., office of this company has been appointed traveling auditor for the Mountain Division, with headquarters at Denver.

Mr. J. W. Dudley of the El Paso, Texas, office has accepted a position in the Salt Lake City, Utah, office of the company.

Mr. James F. O'Donnell, fourteen years manager of the Postal Telegraph-Cable Company of Texas, at Joplin, Mo., has been appointed manager of the Western Union Telegraph Company at the same point. Mr. O'Donnell was born at Nevada, Iowa, March 3, 1866, and has filled many railroad positions as operator, clerk to the superintendent, train dispatcher, etc., and is consequently a man of wide experience in the railroad as well as in the commercial service.

This company is installing in its Spokane, Wash., office a five-position telephone switchboard and a 30-circuit fire alarm, burglar alarm, night watch and sprinkler supervisory switchboard. The burglar alarm and sprinkler switchboard are new additions to the equipment and are being installed by Mr. C. M. Marron, general foreman of the American District Telegraph Company.

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Mr. A. C. Terry, district commercial superintendent, Pittsburg, Pa., was a recent New York visitor.

Mr. H. A. Whitsett, of Hattiesburg, Mississippi, has been appointed manager of the Jackson, Miss., office, vice Mr. A. M. Stanley, resigned to enter other business.

Mr. Frank Easton, recently deputy state engineer of Colorado, has accepted a position in the plant department of the Western Union Telegraph Company at Denver, Col., under Mr. R. W. Whitehead, district plant superintendent.

Western Union Managers Meeting in Syracuse.—A meeting of Western Union managers in the Western section of New York state was held at Syracuse, N. Y., March 23. A telegram was read from general superintendent A. G. Saylor, New York, expressing his appreciation of the meeting and commending its work. Mr. Saylor said: The object of your meeting is fully appreciated, and carried to a conclusion, means success to the company and to each of you individually. I am satisfied that you are taking the same interest in the company's affairs as though they were the affairs of your own, and with a dominating spirit of this character you are bound to succeed."

Mr. C. E. Senseman has been appointed manager of the Spartansburg, S. C., office, vice Mr. F. B. Washington who has been transferred to Macon, Ga., as manager. Mr. Washington succeeds Mr. H. A. Carrell who is now manager of the Savannah, Ga., office.

Morse Electric Club Dinner.

The annual dinner of the Morse Electric Club, New York, which was postponed from February 23, will be held at the Hotel Savoy, Fifth Avenue and 59th Street, April 6. The guest of honor will be Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company.

Many prominent telegraph and telephone men will be present, and among the speakers will be Mr. Union N. Bethell, president of the New York Telephone Company. Mr. Bethell is one of the ablest orators in the profession.

An excellent entertainment programme is being arranged and there is every prospect of the meeting being a memorable one.

The tickets issued previous to the postponement and the seating reservations will hold good unless canceled by April 3, in which case the treasurer will promptly refund.

Marcus D. Crain, aged 70 years, night chief operator in the St. Louis office, died on March 26. During the Civil War he joined the Military Telegraph Corps and saw much active service under General Halleck. In 1863 he was appointed chief operator of the Military office in St. Louis by Colonel R. C. Clowry as a reward for meritorious conduct in the field. After the war he became superintendent of telegraph of the Missouri Pacific Railway, and was afterwards appointed chief operator in the St. Louis Western Union office. He went to Kansas City as chief operator and returned to St. Louis in 1877 as assistant chief operator. In March, 1892, he was appointed night chief operator, which position he held at the time of his death. Deceased was one of the best known telegraphers in the country and had a host of friends.

George D. Perry Appointed General Manager Great North Western Telegraph Company.

Mr. George D. Perry, secretary-treasurer and superintendent of supplies, Great North Western Telegraph Company, Toronto, Ont., has been appointed general manager of that company, to succeed the late Isaac McMichael.

Mr. Perry was born at Whitby, Ont., on April 19, 1858, and was educated at Trinity College School, Port Hope, Ont. He began his business career in November, 1877, when he entered the service of the Standard Bank of Canada in Colborne, Ont. In February, 1880, he was appointed cashier of the Credit Valley Railway Company, which was later absorbed by the Canadian Pacific Railway Company. In February, 1881, he accepted the position of bookkeeper with the Dominion Telegraph Company, Toronto, Ont., and in September of the same year, on the consolidation of the Canadian telegraph lines, he was appointed private secretary to the secretary and auditor of the Great North Western Telegraph Company. He was afterwards advanced successively to the positions of chief clerk, assistant auditor, secretary and auditor, and finally, in 1902, secretary-treasurer and superintendent of supplies.

G. D. PERRY,
General Manager Great North Western Telegraph Company.

James Haviland, who helped Ezra Cornell build the first telegraph line in this country, and who constructed the first telegraph lines in the Middle West, died March 19 in Brookline, Mass. He was born in Elmira in 1825.

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John Lapey—April, 1861-1911.

Many telegraphers throughout the country have good reason to remember John Lapey of Buffalo, who has just rounded out fifty years in the Western Union Telegraph Company's service at that point. He was an operator of the highest rank and was classed with such stars as Harvey D. Reynolds, the late A. S. Ayres, Geo. M. Eitemiller, and others of equal note. Some years ago he filled a position in the Buffalo dock office which was a very important telegraph center over thirty years ago, and the wire upon which he worked was generally shunned, because it meant real hard and fast work for the one who was compelled to receive from him at the Chicago end. Any one who could handle Mr. Lapey's speedy and finished Morse became a member of the "four hundred" of the profession. It was a sufficient recommendation for an applicant for a position to be able to say that he could receive from John Lapey.

It is related that on one occasion an operator applied to chief operator Maynard of the Chicago office for a position. He was recommended as a first-class operator. "Well, we'll see," said Mr. Maynard. "Sit down to the Buffalo dock wire there and show what you can do. John Lapey will send to you." Anyone who could not measure up to John Lapey's standard had no right to be classed as a first-class operator, according to Mr. Maynard's idea.

In reply to an invitation to give an account of his fifty years' experience, Mr. Lapey's thoughts of the past took on a poetic turn and in the following verses he tells a story that would require a page of type to express in prose. It is not our custom to print verse, but we feel that we can make an exception in Mr. Lapey's case on account of his old-time fame and the fact that he has attained the exceptional distinction of being in the service of one company and in one office fifty years.

RETROSPECT.

APRIL 1, 1861-1911.

On April first, in '61,
Just fifty years ago;
To join the Western Union force,
I came to Buffalo.

The wondrous changes that have come
This half a hundred years,
In personnel and business ways,
All like a dream appears.

Remembrance of the past recalls
To mind with pleasing thought,
The old-time "stars" with pen and key;
How skillfully they wrought!

But stars will rise and stars will set,
'Tis life's unchanging tune.
We all, some day, must "30" say,
For no one is immune!

J. L.

Buffalo, N. Y., March 31, 1911.

Mr. Lapey is still in harness and is in charge of the Commercial News Department at Buffalo, and his numerous friends throughout the country will no doubt join us in wishing him many more years of activity and happiness.

The Cable.

Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company, New York, who has been ill and absent from his office for several weeks, sailed from New York March 25 on a West Indian cruise. Mr. Ward was advised to make this trip in order to escape the rigors of the northern climate. He expects to return to New York on April 12.

Mr. Frank B. Gerrard, superintendent of the Commercial Cable Company's station at Hazel Hill, Canso, N. S., who has been on special duty in Newfoundland for the last two years, is in New York.

New Atlantic Cable to South America.—The German cable ship *Stephan* is now occupied in laying a cable across the narrowest part of the Atlantic ocean, from Monrovia, Liberia, to Pernambuco, Brazil. The cable is owned by a German company. This is part of the new system of cables between Germany, Africa and South America. The sections already laid are from Emden, Germany, to the Island of Teneriffe and from Teneriffe to Monrovia, and the *Stephan* is laying the section from Monrovia to Pernambuco. The next step in the work will probably be the laying of a cable from Monrovia to connect with the German possessions on the West Coast of Africa.

James Graves, former superintendent of the Anglo-American Telegraph Company, at Valentia Island, Ireland, died on January 14 last. He joined the Electric Telegraph Company of England in 1852. He was appointed superintendent at Valentia in 1865 when the Anglo-American Telegraph Company was formed, and remained in that company's service until June, 1909. He assisted Mr. J. B. Stearns in the development of the duplex.

Louis A. Lurienne, aged 52 years, representative of the French Cable Company in the United States, for the past fourteen years, with headquarters at New York, died at Paris on March 25 of heart failure. Mr. Lurienne had been a sufferer from heart trouble for the past six months, and had gone to France in the hope that a rest in his native country would restore his health. Mr. Lurienne, before coming to the United States was identified with the government telegraph department in France. Mr. E. C. Sweeney, superintendent at New York, has been looking after the interests of the French Cable Company since Mr. Lurienne went to France six months ago.

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Battery Quadruplex of the Postal Telegraph-Cable Company.

BY J. F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The accompanying illustration shows the main line connections of the battery-operated quadruplex of the Postal Telegraph-Cable Company.

In reading the diagram it will be particularly noticed that the functions of the polechanger are performed by two transmitters, whose local magnets are connected in series with the transmitting key. This permits the use of standard apparatus for both dynamo and battery-operated quadruplexes. The same arrangement is used as a polechanger on a battery duplex. It has been found in practice that this arrangement can be more readily adjusted and taken care of than can the continuity-type of polechanger, and the results are equally as good.

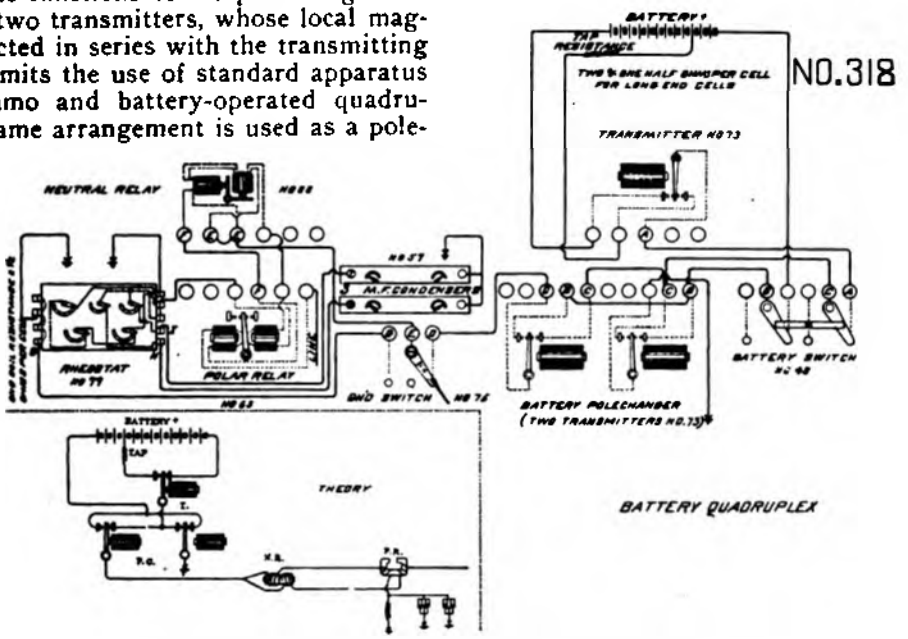

DIAGRAM OF CONNECTIONS OF BATTERY-OPERATED QUADRUPLEX.

Serial Building Loan and Savings Institution.

In the address of President A. G. Saylor, at the recent annual meeting of the Serial Building Loan and Savings Institution, New York, some interesting facts were presented on the subject of Savings and Loan Associations in New York State. He referred to the action of the legislature of 1910 in passing amendments to the banking laws with a view to securing greater uniformity in the management of such associations. This action, President Saylor states, is the result of the untiring work of Mr. E. F. Howell, secretary of the Association, who has been for five years chairman of the legislative committee of the State League.

In order to fully reap the benefits of this new legislation new by-laws regulating the affairs of the Institution will be submitted to the members for approval.

During the year 298 new members were added to the Institution's list, the highest of any one of the past ten years.

"The business of the Institution," he said, "is in a sound and healthy condition, which has been reported upon with favor, following its recent annual examination under the direction of the New York State Superintendent of Banks."

Continuing his address to the members President Saylor said:

"The continued success of this Institution depends more upon the good will and effort of its members than upon the carefulness of its management. We may and do give you an association worthy of your confidence and enthusiastic support, but it is for you to extend its influence and widen its field of operation. It is your duty, it is the duty of every individual member, to add to our roll at least one new member."

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, in conference to discuss matters pertaining to that branch of the service. Those present were: Messrs. E. R. Tilghman, Pittsburg, Pa., M. J. Cook, Boston, Mass., W. J. Taylor, Baltimore, Md., E. Ryder, Hartford, Conn., J. Lapey, Buffalo, N. Y., G. D. Butler, Rochester, N. Y., and W. P. Wheatland, Philadelphia, Pa., and Messrs. S. M. Williams, Geo. B. Scott, W. J. Dealy, Gardner Irving and H. M. Heffner of New York.

Messrs. Dealy, Cook, Lapey, Ryder and Irving are veterans, having been in the Commercial News Department service for more than a quarter of a century.

Convention of Railway Telegraphers. — The Order of Railway Telegraphers will hold its biennial convention in Toronto, Ont., on May 8.

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Quadruplex Installation and Operation.

(Concluded from page 231, March 16.)

[NOTE.—All illustrations referred to in this section were used in connection with the first part.]

THE COMBINATION CONDENSER:—This consists of a wooden box containing three groups of condensers, two of which are adjustable, and the other non-adjustable, as represented theoretically in Fig. 3.

The adjustable condensers, each of which has a total capacity of 3⅜ m.f.'s graded in the manner shown, are to be used in the artificial line for the purpose of securing the "static" balance.

The non-adjustable condenser has a fixed capacity of 1 m.f. and is intended for use as a "spark" condenser, to be placed between the "ground" and the dividing point of the "5-U" coil, as illustrated in Figs. 1 and 4.

THE DYNAMO OR BATTERY VOLTAGE:—This should be of the value necessary to develop in the main line, a working current of about 60 milliamperes with the "long end," and 20 milliamperes with the "short end," under favorable weather conditions.

THE PROPORTIONAL RHEOSTAT:—The resistance values should be adjusted to give a current ratio of 3 to 1, as illustrated in Fig. 3.

LINE RESISTANCE BOX:—This box (shown in the upper right hand corner of Fig. 2) contains a series of resistance coils aggregating 1250 ohms, the whole or certain portions of which may be included in the main line. The primary object of this resistance is to afford a means for increasing the electrical length of short quadruplex or duplex circuits, in order that the latter may be successfully operated on potentials ordinarily used in connection with comparatively long circuits.

It may also be employed to advantage in reducing the strength of earth currents on lines between whose terminal ground plates, potential differences exist that would be detrimental to the working, particularly of short quadruplex circuits.

The use of this resistance may occasionally be desirable on the longer circuits under such changeable weather conditions as might seriously affect the working by disturbing the line balances. The insertion of the line resistance under these circumstances, would have the effect of removing the main line wire from the immediate vicinity of the home apparatus, which would then be less susceptible to the alterations in magnetism brought about by leakage variations.

In all such cases, a compensating resistance equal to that inserted in the main line, should be added to the artificial line, together with condenser retarding resistances of approximately similar value; the distant office being notified of the change thus made in order that any rearrangement of the balance rendered necessary thereby, may be suitably effected at that office.

BALANCING THE QUADRUPLEX:—The usual practice of balancing to the distant "ground" on quadruplex circuits, is now regarded as unnecessary, owing to the presence in the circuit of the milliammeter, which admits of the balances being taken against the distant battery with less loss of time, and under conditions that eliminate all differences that may happen to exist between the ground coil and battery resistance.

RESISTANCE BALANCE:—In taking a resistance balance, proceed as follows:

(1) Ask the distant station to close both keys, which will cause the milliammeter at the home station to deflect to the left, or in what may be called a marking direction.

(2) Note the number of degrees obtained on the needle, first with your No. 1 key open, and then with it closed, the deflection in each case being taken after the needle has come to rest.

(3) While the key is in the closed position, adjust the balancing resistance until the needle reaches a point midway between the two readings above-noted, which point will represent the deflection required to secure the ohmic or resistance balance. If, for instance, the needle stands at 28° on the open key, and at 24° on the closed key, then the adjustment should be such as to bring the needle to a position that will correspond as nearly as possible with the mean of the above two readings, viz. 26°.

It will be found that when the resistance in the artificial line is greater than that in the main line, the needle will swing somewhat deliberately in an upward or spacing direction upon closing the key. And, per contra, the swing of the needle will be in the downward or marking direction should the resistance in the artificial line be less than that in the main line.

STATIC BALANCE:—It will next be in order to take a "static" balance, any disturbance of which will make itself evident by a sudden throw of the milliammeter needle, which will quickly jerk or "kick" in one direction just as the key is being depressed, and in the opposite direction at the moment the key is released, the needle instantly returning to its normal or steady position after each movement of the reversing key.

In order to avoid confusion during these balancing operations, it will be well to disregard the effects produced upon the needle at the opening of the key, and take note only of those observed at the closing thereof.

(1) If, then, upon closing the key, the needle swings, or kicks in a spacing or upward direction, and then rapidly returns to its former fixed position, it will be an indication that the capacity of the condensers in the artificial or compensating circuit is not enough, and should accordingly be increased.

(2) If, on the other hand, the throw of the needle is in the downward or marking direction at the instant of depressing the key, the condenser capacity should be diminished.

The amplitude of the swing or kick in each case, will show the extent or amount of the static unbalance, the latter depending upon the difference between the strength of that portion of the current which suddenly rushes into, and charges any main line possessing electro-static capacity, and that of the current rushing into the artificial line to satisfy the "capacity" requirements of the condensers forming part of the compensation circuit.

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RETARDATION BALANCE:—If the retarding resistances in the paths of the balancing condensers are not accurately adjusted the time occupied in charging and discharging the condensers will differ from that required to charge and discharge the main line. Should this difference be very pronounced, the milliammeter will give a peculiar "double kick" each time the key is opened and closed, this kick being readily distinguishable from that due to the ordinary static unbalance, in having a decidedly more jerky and lively appearance during its exceedingly brief period of existence. It may, however, be somewhat difficult to differentiate between the two, on account of the constant vibration, to which the milliammeter needle is ordinarily subjected by induction from neighboring wires, the effects of such interference rendering accurate readings and close observations a matter of considerable difficulty. Under such circumstances, it may be well to make the final compensating adjustments by rapidly dotting on the No. 1 key, whilst making such alterations of the capacity—and particularly of the timing or retardation resistances—as will cause the needle to show the least amount of disturbance as a result of the changes thus made.

APPROXIMATE BALANCES:—An absolutely perfect balance cannot be secured until the needle ceases to be influenced by the operations of the reversing key, the steady condition of the needle denoting that an equality of potentials (upon which the bridge principle depends) has then been duly established or in other words, that the pressures exerted by the outgoing currents at opposite ends of the "bridge"—in which the milliammeter and polar relay are placed—are equal in magnitude and oppositely directed, thus producing a null effect upon both of those instruments.

An absolutely perfect balance being somewhat difficult of attainment—especially when the time involved is an important consideration—it is only necessary as a rule to obtain a good working balance, that is, one in which the clearness and legibility of the incoming signals are practically unaffected by the outgoing currents.

It should not be necessary in most cases to call in the aid, and await the appearance of any traffic or repeater chief at a distant station for the purpose of restoring a balance, which can usually be effected by suitable "snap-shot" adjustments calculated to meet the practical working requirements, without involving a stoppage of the circuit, or the delay incident to securing the attendance of the particular chief concerned at either the repeater or terminal office.

THE SIGNALING CIRCUIT:—The local signaling device (for calling in quad and duplex attendants) which forms part of the multiplex table equipment for quad and duplex circuits, includes a low resistance signal relay and 2 c.p. lamp, the functions and operation of which are more specifically set forth in the specifications describing this signaling system.

THE QUADRUPLEX REPEATER:—The repeating apparatus is in every way identical with that at the terminal stations.

What Our Friends Have to Say Regarding This Publication.

Mr. C. W. Lemont, of the New England Telephone and Telegraph Company, Springfield, Mass., in renewing his subscription to our publication writes: "Telegraph and Telephone Age improves with age."

Mr. L. D. Wilbourn, district traffic superintendent, Western Union Telegraph Company, Boston, Mass., writes: "You did perfectly right in renewing my subscription. I cannot afford to be without your excellent journal, and I never fail to recommend it to the craft."

Mr. J. McMillan, superintendent of the Canadian Pacific Railway Company's Telegraph, Calgary, Alta., Can., in renewing his subscription for another year, says: "I have recommended to our chief operators their subscribing for Telegraph and Telephone Age and I am quite free to admit that your paper is the best publication of its kind that I know of. Each number contains valuable electrical information enough to keep any man busy until he receives the next number."

Mr. James Hervey Nichols, of Denver, Col., an old-time and military telegrapher, and for many years past one of Denver's successful business men, in renewing his subscription to our paper, writes: "It affords me great satisfaction to see your paper grow. Telegraph and Telephone Age is a necessity." It will be remembered that Mr. Nichols was one of the most interesting telegraph figures during the Civil War. He was at General Grant's headquarters at Appomattox at the time of the surrender of General Lee. When the government turned over the lines to the Western Union Telegraph Company Mr. Nichols was retained as manager of the Petersburg, Va., office. In 1867 he went to Denver.

Gold and Stock Life Insurance Association.—The proceedings of the thirty-third annual meeting of the Gold and Stock Life Insurance Association, which was held in New York, January 16, has been issued in pamphlet form. It is a very complete record of the association's work and includes a list of living and dead members. In a note accompanying the report Secretary W. J. Dealy urges all members to take an active interest in the affairs of the Association by securing new members. Mr. Dealy's efforts should be encouraged and supported by every one interested.

Day-Letter Service on Texas Postal Lines.

The Postal Telegraph-Cable Company of Texas has adopted the 50-word day-letter service on its lines in Texas, Arkansas, Oklahoma, Louisiana, including Joplin, Mo., and Arkansas City and Mulvane, Kan. The rate is one-half more than the regular day rate for ten words. Mr. S. M. English, president and general manager of the company, states that his company stands ready to render superior service of every kind and has authorized this day-letter service on its own lines.

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Improvements in Telegraphy and in Combined Telegraphy and Telephony.

Mr. George E. Hines, a well-known telegrapher of New York, has been granted two patents on telegraph systems and one on a combined telephone and telegraph system.

The first of the former, which is dated April 13, 1909, has for its principal objects economy in maintenance and operation; duplex and quadruplex operation and the doing away, in quadruplex operation, with a battery continuously in circuit. In this system Mr. Hines combines the use of induced currents of definite polarity with battery currents and employs a polarized relay for both sides of the circuit. He also uses polarized relays in connection with devices for sending induced currents over the line when the first side alone is operated, and battery currents over the line when the second side alone is operated, and substitutes battery currents for induced currents, or parts thereof, when both sides are actuated.

His invention, it is claimed, results in greater definiteness in transmission and receiving signals under all conditions and particularly in wet weather when transmission is difficult, since the receiving apparatus on the first side is sensitive to currents of any strength so long as their polarity is reversed, and the receiving apparatus of the second side is responsive to currents from a constant potential source, provided the constant potential is at least as great as the induced potential impressed upon the line at the sending station. Moreover, the relay of the second side does away with disturbance in the main line circuit produced by frequent demagnetization and movement, the demagnetization being eliminated and the movement greatly reduced, and furthermore, does not open the local relay circuit controlled by the relay on the second side in such a manner as to interfere with its action.

Claim 3 reads as follows: In a telegraph system, the combination of a main line, two sources of current, one for sending induced impulses and the other for sending continuous current impulses, a key for controlling said induced impulses and commutating said continuous current impulses and a second key for interrupting said induced and continuous current impulses one kind at a time, and two polarized relays, one responsive to induced and commutated currents only and the other responsive to commutated and uncommutated continuous currents only, the former relay engaging a single contact, the latter engaging forward and backward contacts.

The second patent, issued November 29, 1910, has for its object the transmission over a line to distant stations of dynamic currents of definite direction induced by a local or primary current. Mr. Hines by this invention impresses electromotive forces on a line by means of induction coils having primary and secondary windings. Such currents approach the sine wave form and are more easily transmitted and cause less interference with neighboring lines than where an electromotive force from a constant potential source is impressed directly upon the line, as in present practice. To accomplish this result Mr. Hines employs a transformer having a closed magnetic circuit, and so wound that the primary circuit has the necessary large time constant. A secondary electromotive force is induced in the secondary winding during the whole period of rise of the magnetism of the core, resulting in a secondary current flowing along the line and during this period. Mr. Hines introduces an adjustable self-induction coil in series with the secondary winding, so as to more or less neutralize the capacity of the line.

The transmitting key is preferably such that the electromotive forces impressed upon the primary are all in the same direction, since a reversal of the electromotive force upon a single operation of the key is liable to send two impulses in the same direction and of substantially equal strength, instead of one impulse in a given direction of double strength.

The invention is summarized in claim 2, which reads as follows:

The combination of a main line conductor grounded at each end, closed magnetic circuit transformers having secondary windings in series with said conductor and a key-controlled primary circuit in series with a source of constant current, relays having movable polarized armatures also in series with said conductor, jockeys restraining said armatures against movement due to the action of stray currents, and an adjustable self-induction device also in series with said conductor.

The third patent, issued April 12, 1910, relates to improvements in combined telegraph and telephone systems and has for its specific purpose the combination of a telephone circuit with a single or duplex telegraph circuit. Mr. Hines eliminates the interference between two such systems by the elimination of the static discharge from the line, and accomplishes this result by impressing upon the telephone conductors telegraphic impulses which are of rounded wave form, there being one such wave for each impulse. On account of this wave form the impulses upon the telephone lines are in effect shaded at both the beginning and at the ending, and are in effect single waves of an alternating current and are of such low frequency as compared with telephonic currents as to produce no effect upon the diaphragms of the telephones.

The final claim reads: In a combined telephone and telegraph system the combination of a main conductor, telephonic apparatus connected therewith, said conductor being grounded at each end, a coil in series with said conductor, a second coil in inductive relation to said first coil, a closed magnetic circuit common to said coils, a telegraph key and battery in series with said second coil, an impedance coil located in the ground connection between said first coil and the point to which the telegraphic apparatus is connected receiving relays and jockeys for the armatures of said relays.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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April 1, 1911.

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

The Telegraphers' Mutual Benefit Association.

It is a happy sign of the times and source of great gratification to note that the telegraph companies are recognizing long and faithful service, as indicated by a form of pension plan which we understand is now being considered, based on faithful performance of duty and at a fixed age of retirement.

The companies have for many years shown interest in the employe's family and dependents by urging their caretaking through the medium of the Telegraphers' Mutual Benefit Association, and it is to this worthy association that we now wish to direct special attention.

Every married man at least should give the matter of life insurance very serious consideration. If he has a family to provide for he should, as far as he is able, insure against the contingency of his being taken away at any time, and if he has the ordinary human instincts he will see to it that his family is not left unprovided for.

The Telegraphers' Mutual Benefit Association is one of the strongest fraternal insurance organizations in this country and it is the moral duty of everyone engaged in telegraphy, telephony and related interests, especially if he or she has a dependent family, to lay the foundation for their support in the event of sudden taking away. The history of this organization is one of marked success, but its continued success depends upon the numerical strength and activity of its membership, and the payment of their dues of course, and everyone engaged in the interests referred to should take an active part in promoting its welfare. In so doing he not only helps his own family in time of need, but many others besides.

Everyone engaged in telegraphy and telephony in any department—administrative, operative or manufacturing—is eligible to membership in this association, and if even one-half of the members should make an endeavor to secure a new one the activity and strength of the organization would be greatly augmented.

Mr. H. J. Pettengill, president of the Southwestern Telephone and Telegraph Company, Dallas, Tex., through the columns of *The Southwestern Telephone News*, brings forcibly to the attention of telephone employes the advantages of membership in this association. He gives a brief history of the organization and points out its financial strength, having a reserve fund of over $325,000. Mr. Pettengill has been a member of the association for thirty-three years and has recently been appointed one of the newly created Advisory Board. "The Association," he states in the communication referred to, "has the entire confidence of its members, who unhesitatingly recommend it to you as an institution that has done and is doing much substantial good for the fraternity and humanity in general." He closes with the statement that representatives of his company will be appointed agents for the association in the principal cities in Texas and Arkansas.

This action on the part of one so prominent in the telephone field augurs well for the future of the association, and no doubt similar action will be taken by other telephone officials throughout the country. This activity should prove to be a stimulus in the telegraph field. There are hundreds—probably thousands—of eligible persons in the telegraphic ranks who should be urged to join the association, and every member should make some effort to get these persons interested. We advise all who are not members of this worthy association to give the matter their careful consideration.

Federal Corporations Tax Law Declared Constitutional.

The United States Supreme Court on March 13, handed down a unanimous decision affirming 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.

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Extinction of the Loan Shark in Telegraph Offices.

In our issue for January 16 we referred to the plan instituted by the Western Union Telegraph Company to make financial loans to those of its employes who need extra money to meet exceptional emergencies, and thus get rid of the annoyances resulting from the importunities of loan sharks into whose traps the unfortunate borrower had been caught.

It is gratifying to note the good that has already resulted from this step. Borrowers of company funds can now stand up like men and look other men squarely in the face, with a feeling of relief over the fact that they have been saved from the machinations of the wily Shylock.

An aggravated case in New York taken up by the company was that of an employe whose entire salary was pledged to satisfy the greed of the money lenders. He began by borrowing of them a small sum to tide himself over an emergency, and before he realized it his indebtedness grew to alarming proportions. The interest, so-called, accumulated so rapidly his salary was garnisheed on an average two or three times a month. His case seemed hopeless until the company came to his rescue. It loaned him sufficient funds to free him from his indebtedness to the loan sharks and he is returning the money to the company without interest, in small weekly sums.

It is needless to say that this man is now one of the happiest individuals in New York, now that he is free from the human parasites, who live on the weaknesses and misfortunes of their fellow men.

Interstate Commerce Commission Decides That Telegraph and Telephone Companies Are Subject to Law of Common Carriers.

The Interstate Commerce Commission on March 20 issued the following rules and regulations for telegraph and telephone companies:

"1. Each and every telegraph and telephone company which transmits messages over its line or lines from a point in one state, territory or district of the United States to any other state, territory or district of the United States, or to any foreign country, is subject to the provisions of the act.

"2. If a telegraph or telephone company at the time of which is wholly within a single state, territory or district of the United States, receives a message within such state, territory or district of the United States, for transmission to a point within the state, territory or district, which it transmits over its line to another point in the same state and there delivers it to an inter-state line for transmission to destination, the first-named company, by virtue of its participation in this transaction, is not made subject to the provisions of the act, unless there be an arrangement between that company and its connection for through continuous transmission of such messages, in which latter case all of the participating companies in such through continuous transmission are subject to the provisions of the act.

"3. If two or more lines are connected so that a person within one state, territory or district of the United States talks with a person at a point without such state, territory or district of the United States, or so that a message is transmitted directly from a point within a state, territory or district of the United States, to a point without the same, the transmission of messages in this manner constitutes inter-state commerce and brings all of the participating lines within the purview of the act.

"4. It follows that telegraph and telephone companies subject to the act, as above indicated, must conform to the provisions of Section 1 thereof, requiring that all of their rates and charges for the transmission of inter-state messages shall be reasonable and just, and that such companies may lawfully issue franks covering free inter-state service or may grant free inter-state service to the same extent, and subject to the same limitations, as other common carriers under the provisions of said section.

"5. Such telegraph and telephone companies subject to the act are also governed by the provisions of Section 3, forbidding any undue or unreasonable preference or advantage by rebates or otherwise, or any undue or unreasonable prejudice or disadvantage in any respect whatsoever, and are subject to the lawful orders of the commission made pursuant to the provisions of Section 15 of the act, and also of Section 20 thereof respecting the keeping of accounts and memoranda and the making of reports to the commission.

"The commission at this time withholds expression of its views regarding other questions which have arisen with respect to the amenability of these carriers to the provisions of other sections of the act."

Edison's Secret of Hard Work.

Mr. Thomas A. Edison, who recently celebrated his sixty-fourth birthday by spending three-fourths of the day at hard work, surprises even his intimate friends by his endurance of mental labor. In a conversation in 1909 he remarked, as if it were nothing out of the way, that up to seven years previously his average of daily working hours was nineteen and one-half, but that since then he figured it at eighteen. It was suggested that the secret of it might be that he did not live in the past, but was always looking forward to a greater future. He replied: "Yes, that's it. I don't live with the past: I am living for to-day and to-morrow. I am interested in every department of science, arts, and manufacture. I read all the time on astronomy, chemistry, biology, physics, music, metaphysics, mechanics, and other branches—political economy, electricity, and in fact all things that are making for progress in the world."

Kansas Public Utilities Commission.—The bill passed by the Kansas legislature creating a Public Utilities Commission for that state, will become a law on May 1. It provides for the regulation and control of public utilities and common carriers, including telegraph and telephone companies.

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Damage to Chestnut Telephone and Telegraph Poles by Wood-Boring Insects.

BY THOMAS E. SNYDER.

The United States Department of Agriculture has recently issued a pamphlet on the subject of damage to chestnut telephone and telegraph poles by woodboring insects. The investigations were made by Mr. Thomas E. Snyder, agent and expert, and his report, slightly abbreviated, follows:

It has recently been determined through special investigations conducted principally by the writer that serious damage is being done to the bases of standing chestnut telephone and telegraph poles in certain localities by the grub or larva of a wood-boring beetle, here called the chestnut telephone-pole borer. The character and extent of the damage under different conditions of site in several localities have been determined, and poles treated with various preservative substances have been inspected to compare the efficiency of both chemicals and methods of treatment. These investigations have resulted in the determination of practical methods of preventing injury to poles by wood-boring insects.

The first information of serious damage to standing chestnut poles by wood-boring insects was conveyed in a letter, dated December 15, 1906, from E. O. Leighley, a correspondent of this Bureau, reporting damage to telephone poles in Baltimore, Md., by borers. The borers were identified as cerambycid larvæ, and later were determined to be the chestnut telephone-pole borer.

On December 16, 1906, Mr. H. E. Hopkins, division superintendent of a telephone company, stated that the poles in West Virginia were badly injured by borers and that these borers were abundant.

The writer on October 3, 1909, inspected some chestnut telegraph poles which had been standing for about twelve years on New York avenue, in Washington, D. C. The poles had been taken down under orders from the city authorities, which necessitated the placing of wires in conduits under ground, and they had been lying in piles for about a month before they were inspected. The chestnut telephone-pole borer had been working in the base of the poles, and white ants, or termites, were associated with them. Twelve out of the 103 poles examined had been damaged, some more seriously than others.

On October 15, 1909, Mr. H. E. Hopkins stated that in one line built twelve years ago (40 miles long, 36 chestnut poles to the mile, poles 20 to 40 feet long and 5 to 12 inches in diameter at the top) approximately 600 poles had been rotted off at the top of the ground, and inspection showed that 95 per cent. of the damage was directly or indirectly due to insects. Other lines in this division were reported to be in about the same condition. It was later determined that most of the insect damage was the work of the chestnut telephone-pole borer.

Dr. A. D. Hopkins states in a recent comprehensive bulletin that "construction timbers in bridges and like structures, railroad ties, telephone and telegraph poles, mine props, fence posts, etc., are sometimes seriously injured by wood-boring larvæ, termites, black ants, carpenter bees, and powder-post beetles, and sometimes reduced in efficiency from 10 to 100 per cent." Thus, while it has been known that almost all classes of forest products that are set in the ground are seriously injured by wood-boring insects, the problem of insect damage to standing poles, posts, and other timbers has never been made the subject of a special investigation.

In May, 1910, this study was assigned to the writer, and, in addition to a study of the insects involved, investigations in co-operation with telephone and telegraph companies have been conducted in the District of Columbia, Maryland, Virginia, Pennsylvania, New Jersey, and New York. Through the courtesy of the Western Union Telegraph Company several telegraph lines were inspected in July and August, 1910, in Virginia, where the poles were being reset or replaced. Here the butts of over 200 poles set under different conditions of site were thoroughly examined for insect damage, and sometimes the entire pole was split open. In one line 10 to 12 years old (approximately 30 chestnut poles per mile, 25 feet long, about 6 inches diameter at the top, 10 inches at the base, and apparently of second quality), between Petersburg and Crewe, Va.—the poles had already been reset once, east of Wilson, Va.—serious damage by the chestnut telephone-pole borer rendered from 15 to 20 per cent. of the poles unserviceable. After the present second resetting it was estimated that the poles can not last more than four or five years longer. West of Wilson the poles were naturally in much worse condition, and many were broken off and only held up by the wires on the sounder poles. In another line examined, between Portsmouth and Boykins, Va. (poles 30 feet long and apparently of second quality), serious damage by this borer averaged about 10 or 15 per cent., and between Boykins, Va., and Weldon, N. C., according to a lineman, 50 per cent. of the poles are badly decayed near the surface of the ground. Much of this damage, however, is due to fungus heart rot. According to a statement by the foreman of a resetting crew, between Asheville, N. C., and Spartanburg, S. C., hundreds of chestnut poles were badly decayed in the 67 miles of line reset, and were only held up by the wires. The line was 15 years old. There was serious damage by "wood lice" (termites) and also by "white wood worms."

The chestnut pole borer is very widely distributed, ranging from Ontario, Canada, to Texas, eastward to the Atlantic coast, and westward to Arizona and southern California. It is common throughout the natural range of the chestnut—and in this connection it should be observed that most of the chestnut poles are purchased from local timber-land owners.

The injury to the poles consists in large mines in the wood near the line of contact of the pole with the ground, necessitating the frequent resetting or even the replacement of the damaged poles. These irregular galleries of the grub run both horizontally

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and longitudinally throughout the heartwood, and are sometimes seven inches long, but vary with the individuals, which show great differences in size. The borers usually work in the outer layers of the wood at the base of the pole for a distance of from two to three feet below, and sometimes from one to two feet above the line of contact of the pole with the surface of the ground. The greatest damage is to that area just below and just above the surface of the ground; here the conditions of air and moisture are most favorable. Often the entire butt up to a distance of from 4 to 6 feet and higher, according to the depth of setting, is mined. The numerous galleries, often very close together, completely honeycomb the wood in a zone three to four inches in from the exterior of the poles; this so weakens the poles that they break off close to the surface of the ground. The basal two feet is usually sound. Even if the damage is not serious enough to cause the poles to break off under strain, they are likely to go down during any storm, and thus put the wire service out of commission; such damaged poles are a serious menace along the right of way of railroads. The beetle will attack poles that are perfectly sound, but evidently prefers to work where the wood shows signs of incipient decay; it will not work in wood that is "sobby" (wet rot), or in very "doty" (punky) wood. It has not yet been determined just how soon the borers usually enter the poles after they have been set in the ground. However, poles that had been standing only four or five years contained larvæ and adults of this borer in the heartwood, and poles that had been set in the ground for only two years contained young larvæ in the outer layers of the wood.

Poles that appear sound on the exterior may have the entire basal interior riddled, and the work of the borers is not noticed until the poles break off. If merely isolated poles are injured, the poles that are broken off are held up by the wires and can be detected by the fact that they lean over, but if several adjacent poles are affected, especially where there is any unusual strain, that portion of the line is very likely to go down. The presence of the borers in injurious numbers can be determined only by removing the earth from about the base of the pole; the exit holes of the borer are found near the line of contact with the soil. Often large, coarse borings of wood fiber project from the exit holes. Sometimes old dead parent adults are found on the exterior of the poles underground. During August the young adults may be found in shallow depressions on the exterior of poles below the ground surface.

The subject of the relation of insects to the rapid decay of chestnut poles has not been thoroughly investigated in the past, but now that the supply is becoming scarcer it is especially important to know what are the various primary causes of the deterioration of these poles, hitherto described under the vague term "decay." Although the chestnut telephone-pole borer has not hitherto been considered an insect of any economic importance, and has been described in entomological literature as only living under bark, principally of pine, or in the decomposing wood of various species of deciduous and coniferous trees, the evidence is abundant that breeding in the bases of chestnut poles is not a newly acquired habit. It has also been determined that this beetle damages many species of living forest, fruit, and shade trees that have been previously injured by fire or other causes, and often leads to the destruction of trees that would otherwise recover from such wounds, and while not normally a primary enemy to trees, may thus become of more than secondary importance.

The damage by the chestnut telephone-pole borer is especially serious in consideration of the fact that in many parts of its range the chestnut is threatened with extinction as a tree species on account of the very severe ravages of the combined attack of an insect and a fungus disease. Further unnecessary drain upon the supply of chestnut timber should be avoided by protecting that already in use and thus prolonging its length of service.

As more than one-fourth of the 3,500,000 round poles exceeding 20 feet in length used annually by telephone, telegraph, and other electric companies are chestnut, and as this borer has seriously damaged as high as 10 to 40 per cent., varying with conditions of site, of the chestnut poles which have been set in the ground for from ten to twelve years in lines in North Carolina, Virginia, West Virginia, Maryland, and the District of Columbia, it is evident that this insect is an important factor in decreasing the normal length of service of the poles.* In lines from twelve to fifteen years old the damage is much greater, and at the end of this number of years of service any line in which poles of this species are set has to be practically renewed. According to a statement in Forest Service Bulletin 78 (Sherfesee, 1909), "approximately four per cent., or 5,908 feet board measure of the 147,720 feet board measure of standing poles annually requiring replacement in the United States, is destroyed by insects." If only chestnut poles can be considered, at least ten per cent. of the poles reset or replaced are injured by insects.

The damage is apparently greatest and the borers are most abundant where the poles are set in high or level dry ground under good conditions of drainage. Such sites are the crests of railroad cuts through low hills, slopes of "fills," and in cultivated or other fields. Where the poles are in wet sites there is usually little injury by wood-boring insects except to that portion near the surface of the ground. Conditions of drainage are more important than different soil combinations, and the condition of the soil is more important than its composition; *i. e.*, where the soil is hard packed there is apparently less damage than where it is loose. The quality and condition of the poles before setting

*The average life of a chestnut pole is eight to ten years (Sherfesee and Weiss, 1909).

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is a very important factor to consider before arriving at any conclusions as to the relative longevity of poles under various conditions of site. Green (unseasoned) or imperfectly seasoned poles are less durable than those thoroughly seasoned. Poles that are defective before setting, as they very often are (i. e., showing evidence of incipient decay), and poles that have the heartwood mined by the chestnut timber worm, the work of which is very abundant, will, of course, decay much more rapidly than poles that are in a sound condition. The galleries of the chestnut timber worm afford an entrance to the spores of wood-destroying fungi, and thus greatly accelerate decay. White mycelium compactly filled these galleries throughout many standing poles, thus clearly proving that these mines aid greatly in enabling the fungus heart rot more rapidly and completely to penetrate the entire heartwood of the poles. If the injury of both wood-boring beetles and wood-destroying fungi (between which there is a varying interrelation) be considered, then in several lines from ten to twelve years old in North Carolina, Virginia, and West Virginia at least 50 per cent. of the poles are either rendered unserviceable or their length of service is much shortened.

It is not to be concluded that this wood-boring beetle is the only insect that injures standing chestnut poles. Indeed, the most common injury is by the "wood lice" or white ants. In lines from ten to twelve years old these insects have seriously damaged as high as 15 per cent. of the poles, and their work is often present, at least superficially, in as high as 75 per cent. of the poles under all conditions of site. However, the damage is usually to the outer layers of the wood, where it is moist or there is incipient decay, and is more superficial and localized than that of the chestnut telephone-pole borer. Nevertheless, white ants often completely honeycomb the sound heartwood of poles, especially at the base. They work both in sound wood, "doty" (dry rot) wood, and "sobby" (wet rot) wood. Sometimes a large channel runs up through the core of the heart and the sides are plastered with clay, forming a hollow tube with several longitudinal galleries. Their work often extends from two to four feet above the surface of the ground. They leave the outer shell of the wood intact and work up through the longitudinal weathering checks, covering the exterior of the pole with earth to exclude the light. White ants will damage poles that have been set in the ground only two years. Evidently they enter the pole from below the surface of the ground.

A giant round-headed borer is sometimes found in the poles, usually in association with the chestnut telephone-pole borer. In poles where the wood is sound this borer apparently works as a rule only in the outer layers of the wood, the galleries running longitudinally through the heart below the surface of the ground. In poles where there is decay it will completely honeycomb the heartwood near the surface of the ground.

In several poles where the wood was "doty" a large Scarabæid which has before been found in decayed oak railroad ties was present and caused the poles to break off sooner than they otherwise would. The irregular galleries of the grub completely honeycomb the decayed heartwood near or just below the surface.

A flat-headed borer and wireworms were found in galleries locally in the more or less decayed heartwood of several poles. A large black carpenter ant does some damage to sound poles set in dry ground through woodland. This ant often widens the longitudinal weathering checks and thus accelerates decay. A small black ant was very numerous in many poles, but its work is usually confined to the outer layers of the wood. The work is often throughout "doty" poles. Injury by this ant is not primary, but it also widens weathering checks, enlarges other defects, and induces more rapid decay.

Regarding prevention of the injury, Doctor Hopkins makes the following statement in a recent bulletin: "Insect damage to poles, posts, and similar products can be prevented to a greater or less extent by the preservative treatments which have been tested and recommended by the Forest Service for the prevention of decay. These should be applied before the material is utilized for the purposes intended, or, if it be attacked after it has been utilized, further damage can be checked to a certain extent by the use of the same substances.

"It is often of prime importance to prevent injury from wood-boring insects, for the reason that such injuries contribute to more rapid decay. Therefore, anything that will prevent insect injury, either before or after the utilization of such products, will contribute to the prevention of premature deterioration and decay."

Through the courtesy of the American Telephone and Telegraph Company and the Forest Service, about 40 chestnut poles set in a test line near Dover, N. J., were inspected by the writer on July 15, 1910, in company with engineers of the telephone company and Mr. H. F. Weiss, assistant director, Forest Products Laboratory, Forest Service, to determine the relative merits of various methods of preventing damage by wood-boring insects to the bases of poles. In this line, which is eight years old, variously treated poles alternated with untreated poles in order that each chemical preservative and method of treatment might be given an absolutely fair test under the same conditions of site. The poles were 30 feet long, 7 inches in diameter at the top, and 33 inches in circumference 6 feet from the base. In this inspection the earth was removed (to a depth of about 1 foot) from the base of the pole, and then the pole was chopped into to determine the rate of decay. This method of inspection for insect damage is not very satisfactory. The various methods experimented with in this test line were brush treatments with a patented carbolineum preservative and spirittine, charring the butt, setting the pole in sand, and setting it in small broken stone. It was found that, although these methods may temporarily check the inroads of wood-boring insects, they will not keep the insects

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out of the poles. The most serious damage to the poles in this line was by white ants. Other insect damage was by a large black carpenter ant and the larvæ of a round-headed borer.

An inspection was made, between September 6 and 14, 1910, of the bases of over 400 chestnut poles set in a similar test line near Warren, Pa., and Falconer, N. Y. These poles were treated by the creosote "open-tank" method of impregnation, and brush treatments of creosote, wood creosote, creolin, two different carbolineum preservatives, and tar; they had been set in the ground for a period of five years. All these treatments, except the brush treatments with creolin and tar, were efficient in preventing the attacks of wood-boring insects, at least for a five-year period, in this northern climate. There was little damage by insects to the poles in this test line. The most common injury to the untreated poles was by the large black carpenter ants, which widen the longitudinal weathering checks, and hence induce more rapid decay. The work of the chestnut telephone-pole borer was found in several poles, and this beetle was evidently just beginning to attack these poles. There was some damage by a round-headed borer. No white ants or termites were present and this is evidently too far north for these destructive borers. A report by inspectors of the American Telephone and Telegraph Company and the Forest Service on the remainder of the poles in this test line (between Jamestown and Buffalo, N. Y.) not personally inspected by the writer, showed that these conclusions can be applied to all the poles in the line with the exception that there was superficial injury by small black ants to two poles treated by brush treatments of carbolineum avenarius and to two treated with wood creosote; also, as the inspection progressed, injury by the chestnut telephone-pole borer became more abundant and serious, and the borers seemed to be established in the poles. The poles treated by the creosote "open-tank" method of impregnation and by brush treatments with creosote and with "S. P. F." carbolineum remained uninjured.

Methods of treating poles superficially by brushing with various preservatives have proved to be temporarily efficient in keeping wood-boring insects out, if the work is thoroughly done and not only the butt, but also the base, is treated. If the pole is not thoroughly brushed, insects enter through the untreated or imperfectly treated portions, especially through weathering checks and knots. Where the base is left untreated, insects, especially white ants or termites, enter the pole from below ground and, avoiding the treated portions, come right up through the pole.

The few poles of southern yellow pine in a line near Bartley, N. J., inspected on July 15, 1910, which had been impregnated with cresote by the Bethell cylinder-pressure process, 12 pounds of oil to the cubic foot, and had been set in the ground since February, 1903, were apparently free from signs of decay or damage by wood-boring insects. In another line, running between Norfolk, Va., and Washington, D. C., the few poles (12 years old, of squared—with the sapwood cut away—southern yellow pine) inspected on August 10, 1910, near Portsmouth, Va., which had been impregnated with creosote by the Bethell cylinder-pressure process, were also apparently sound.

Thus, it is evident that impregnating the poles with creosote by some standard process (either the open-tank or the cylinder-pressure processes) will keep wood-boring insects out and preserve the poles for a much longer period than they would last untreated. In the open-tank method only the area most subject to the attacks of wood-boring insects and deterioration in general (i. e., the basal eight feet) is treated, while by the cylinder-pressure processes the entire pole is impregnated. Alternating less susceptible juniper (red cedar) poles or pine poles thoroughly impregnated by some standard process in the line with the chestnut poles would be a safeguard in holding up an old line where the damage is found to be serious on resetting.

New Book.

The Wireless Operator's Pocketbook of Information and Diagrams, is the title of a 174-page book just issued by the Bubier Publishing Company, Lynn, Mass. 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 of the latest 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 approved circuits for all sizes of 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. The book is very liberally illustrated and the price is $1.00, $1.25 or $1.50, according to the style of binding which is in cloth, leatherette and leather, respectively. Postage is 8 cents additional.

This and other books on electrical subjects can be supplied by Telegraph and Telephone Age, 253 Broadway, New York.

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The British Telegraph Service as a Government Institution.

The following article reprinted from the London *Spectator* is a rather severe arraignment of the British telegraph service as a government enterprise. Of course it is only one side of the story, yet the facts are impressive.

"At the end of the present year the Postmaster General will take over the whole of the vast business now in the hands of the National Telephone Company," says the *Spectator*, "and will then become possessed of an absolute monopoly of telephonic communication.

"In order to realize what this means," it continues, "or may mean, it is necessary to trace, as Mr. Herbert Laws Webb has done in a very useful little book (The Development of the Telephone in Europe), the history of the purchase of the telegraphs by the postoffice.

"When that project was first mooted, Mr. Scudamore, one of the officials of the postoffice, was called upon to make an estimate of the probable cost. His first estimate, made in 1866, was that the whole of the plant of the two telegraph companies could be bought up for £2,500,000, and he calculated that the net revenue would amount to 8.8 per cent. on the capital. He subsequently made other estimates, rising rapidly till his fourth estimate, made in 1869, put the capital expenditure at £6,750,000, but he was careful, at the same time, to put up his estimates of revenue so as still to show a profit.

"Finally, parliament voted £7,000,000 for the purchase, and, having done so, speedily discovered that that sum was insufficient.

"Among other incidents of the transaction, which would have been humorous if it had not been so serious for the nation, was the discovery, after the bargain had been completed with the telegraph companies, that they only had a leasehold interest in their wires running along the railway lines and that the railway companies must be compensated for their freehold interest. When the capital account was finally closed it reached nearly £11,000,000.

"In spite of the obvious superficiality of these estimates, Mr. Scudamore and the other enthusiasts for the state purchase of the telegraphs succeeded in converting the ministry of the day to their view of the financial success that the purchase would prove, and rosy pictures were painted in the house of commons of a large and increasing net revenue from the telegraphs which would be sufficient in fifteen or twenty years to wipe off the whole of the capital cost, and leave the taxpayer a magnificent source of income to be used in relief of taxation.

"It is safe to say that unless the house of commons had been deluded into the belief that the purchase would prove commercially profitable it would never have sanctioned such an adventure with the money of the state.

"Barely twelve months had elapsed before the disillusionment came. There was, it is true, a small net profit made on the first year's working, and a very much smaller profit the second year.

"After that the net revenue rapidly fell below the amount necessary to pay interest on capital, and, as a matter of fact, except for the first and second years, interest on capital never has been paid out of the profits of the concern. It has been met out of the exchequer, or, in other words, has been a charge upon the taxpayer.

"This, however, is only the beginning of the story. As years went on, the cost of working the telegraphs under state control rapidly increased out of all proportion to the revenue earned. Simultaneously pressure was put upon the department by the house of commons to reduce the charges, and it was constantly urged that lower charges would mean higher profits.

"Possibly this might have been the case if the undertaking had been worked by an enterprising commercial company, for before the purchase of the telegraphs by the state the companies principally concerned had progressively reduced their charges and improved their service for the sake of obtaining a more profitable business. But under state control lower charges meant, as a matter of fact, less profit, with the result that the gross revenue speedily fell far below the gross expenditure.

"This point is extremely important, because the apologists of state purchase have for years spread the inaccurate statement that the telegraphs have only failed to show a profit because of the high price paid for them. This is entirely untrue, for except for the first two or three years the postoffice has not been charged with interest on capital, and during the greater part of the administration of the telegraphs by the state the revenue has failed to meet working expenses.

"Nor is this all; for year by year parliament has granted large sums to the postoffice to be used as capital for telegraph development, but has charged no interest upon any of these advances. 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 £35,000,000.

"Nor can we console ourselves with the reflection that for this £35,000,000 the state has a valuable asset, for that asset, such as it is, involves every year on its working an additional loss of over £1,000,000.

"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 repre-

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sented 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.

"Curiously enough, the one gleam of real enterprise displayed by the postoffice is in connection with race meetings, where the telegraphic arrangements are, we understand, generally excellent. But we dispute altogether the right of the advocates of state action to assume that the state control of the telegraphs has given the country a better and cheaper service than the companies would have done.

"During company control the rates were constantly being lowered and the service extended, and after the telegraphs passed into the hands of the government, inventions were made (notably duplex and multiplex telegraphy) which ought to have immensely reduced the cost of working.

"Yet such is the fatal incapacity of governments to conduct a commercial undertaking that, as Mr. Webb has conclusively shown, the working cost per thousand telegrams is actually more to-day than it was thirty years ago.

"What is even more serious is the effect of the state monopoly of the telegraphs upon the development of the telephone. If the telegraphs had remained in private hands the telephone would have entered the field as a separate concern, and its competition would have forced the telegraph companies to give better terms to the public. Probably, after a more or less prolonged struggle, the telephone would have established itself as a universal means of communication for short distances. But as the postmaster general was held by the law courts to have a complete monopoly of all electrical intercommunication, he was able for many years to block the development of the telephone.

"Finally, when compelled by public opinion to modify his attitude, he insisted that the telephone companies should pay him no less than 10 per cent. on their gross receipts. It will amuse our readers to learn that up till a couple of years ago, this heavy royalty on the receipts of the National Telephone Company, which, in effect, is nothing more or less than blackmail, was actually credited by the postmaster general to the earnings of the telegraph department.

"Yet, in spite of paying this royalty, now amounting to nearly £300,000 a year, the National Telephone Company is able to pay its shareholders a dividend of 6 per cent. while the postoffice telephone system shows hardly any profit at all, even on the most favorable construction of the official figures.

"In view of these facts the financial prospect of the acquisition of the business of the National Telephone Company by the postoffice is appalling, and we therefore heartily welcome Mr. Webb's practical suggestion that the government, instead of taking over the National Telephone Company's telephones, should create a new authority, somewhat on the lines of the Port of London authority, which would take over both the postoffice system and the company's system.

"It should pay the government a reasonable percentage on its taking, and arrangements should be made for reduction in its charges to the public going hand in hand with any increase in dividends. Subject to these conditions, it should be allowed—nay, encouraged—to work for a profit like any other commercial venture.

"Working for a profit is the best incentive to efficient, and so to beneficial training.

"This authority would of course have to be absolutely independent both of the treasury and of the house of commons, and free to borrow money upon its own credit. For if the telephone system of this country is to be developed to anything like the extent to which it has been developed in the United States under private enterprise, large sums of capital—probably £5,000,000 or £6,000,000 at least—must be expended every year for many years to come; while, if the system is to be worked so as to produce a profit, instead of a loss, the controllers of it must not be subject to political influences, which have made the telegraph service so complete a failure from the commercial point of view.

"We therefore commend this proposal very strongly to the present government, in spite of their predilection for state enterprise. For in the long run the hard facts of finance are unanswerable. The country is already committed to vast schemes of expenditure, and there is a growing feeling of irritation at the burden of taxation.

"If the postoffice takes over the telephones itself the ghastly failure of the telegraphs will certainly be repeated; if a separate telephone authority is created, there is a reasonable prospect of a satisfactory profit for the state."

New System of Multiplex Telegraphy.

A new system of multiplex telegraphy has been invented by Mr. C. Andraini, an Italian engineer. The Morse code is used and, according to a foreign publication, it is possible to transmit more than ten messages over one line at the same time. Each closure of a key causes a blade to vibrate, which is tuned to a certain sound, and this transmits to the line alternating currents of high power and of known and invariable periods. The currents transmitted by the blades "disconnect themselves at the receiving station, and by means of special mechanism associate themselves with different Morse instruments." The adoption of the new apparatus, it is stated, necessitates very slight alterations in existing instruments.

Mr. S. S. Bogart, executive engineer of the New York Continental Jewell Filtration Company, New York, in renewing his subscription for another year writes: "Enclosed find my check for one year's renewal of my subscription. I began many years ago, when the Age was in swaddling clothes. Are there many older subscribers? I have the best of reasons for continuing. The Age is progressive, instructive and interesting."

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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.]

(28) Q. When lines of force are expressed in square inches, how can I reduce them to equivalent square centimeters, also, please give me the rule to change them from square centimeters to square inches. C. E. G.

A. (1) To reduce from lines of force per square inch to lines of force per square centimeter, divide by 6.45. (2) To reduce from lines of force per square centimeter to lines of force per square inch multiply by 6.45.

(29) Q. Will you please state the rule for finding the efficiency of a battery? W. Y. P.

A. Divide the resistance of the external circuit by the resistance of external circuit plus the internal resistance of the battery and multiply by 100. The result will be the efficiency.

(30) Q. Please tell me when the first submarine cable was laid between England and America, also give a brief history of it. Also please tell how many cables there are now across the Atlantic between England and America. E. A. A.

A. The first cable was laid in August, 1858, but it failed entirely within two months afterward. During that time 732 messages were transmitted through it. A message of twenty-six words occupied twenty-five minutes in transmission; now a message of that length can be transmitted in one minute. There are thirteen cables in operation across the Atlantic between England and America at the present time, the latest being laid in the past few months. A description of this cable was published in our issue of March 1, on page 202.

(31) Q. (1) If there are two telephone lines each one mile long, one composed of two No. 12 wires and the other one No. 12 wire and the ground what will be the difference in the resistance; in other words what is the resistance per mile of the ground?

(2) Our country lines, being ground return, are bothered considerably by cross talk. Would it lessen the induction any if we were to coat the wires with some kind of paint by saturating rags and dragging them over the wires? B. E. F.

A. (1) The resistance of No. 12 B. W. G. iron wire per mile is 29.1 ohms. On the assumption that your lines are of iron the resistance of the metallic circuit would be 29.1 x 2 = 58.2 ohms, and that of the grounded line 29.1 ohms, the difference of the two resistances being 29.1 ohms. The resistance of the ground is regarded as zero so does not enter into the calculation. (2) Coating your wires with paint will not prevent induction. Inducton could be diminished by properly transposing the wires on the poles, that is by changing the relative positions of the wires on the poles or cross arms.

(32) Q. Kindly tell me what Mr. Marconi's Christian name is. I notice that he is sometimes called W. Marconi and again G.? T. M. W.

A. His name, in Italian, is Guglielmo, which, in English, is William, the "G" and "W" being the initials of the different forms of the same name.

Some Curious Tests of Cable Core.*

BY HAROLD OHLSON.

A strange phenomenon was noticed by the writer a few months ago while testing submarine cable core, and some notes on it may prove of interest. Tests for 10 minutes with a battery of 1,500 Leclanché cells were being taken on lengths of core served with yarn and coiled in small iron tanks, each able to contain two lengths of two nautical miles. The tanks were close together, but not in contact, and rested on the floor of the factory, an iron pipe for waste water, connecting them at the bottom and grounded. It was noticed that the first set of zinc-to-line readings was often, but not always, too high by nearly a constant number of scale divisions; the readings with carbon-to-line were always correct. An actual test was as follows, the first three readings only being given:—

	Zn to line.	*C to line.*	*Zn to line.*
First minute	251	206	206
Second "	166	120	120
Third "	137	91	91

It will be noticed that zinc readings taken after carbon to line had been used were not disturbed. From a number of observations and experiments the following facts were established:

(*a*) The disturbance was never present except in these small tanks, and was never observed even in them when carbon to line was being used: (*b*) it was usually only the first set of zinc readings that was disturbed, although occasionally subsequent tests were affected; (*c*) the rise in deflection would sometimes suddenly appear after the zinc had been applied for several minutes, a constant deflection being added to the normal; (*d*) a length disturbed on one day might be tested on the next under apparently exactly similar conditions, and a good test obtained; (*e*) these false readings were never noticed with lower battery powers; (*f*) they were invariably much larger when testing the top length in the tank.

From these observations it was deduced that the disturbance only occurred when the tank was raised to the high potential relatively to the core conductor, pointing to an electrostatic effect. From (*f*) it would appear that the disturbance was probably nil on the bottom flake and a maximum on the top, and it was noted that the only connection between the tanks was at the bottom. The remedy was then obvious: the tanks were all joined from rim to rim by copper wire where they approached each other most closely, and the disturbance disappeared. Although some of the phenomena noted are difficult of explanation, the remedy has seemed complete, and the writer offers it in the hope that it may be of service to others whose tests may be dis-

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turbed in a similar manner. Briefly, it was found that when testing core with a high-potential battery in tanks not completely sunk in the earth, it is necessary to have metallic connection, top and bottom, between all the tanks when they are grouped in a small space.

The Vitality of a Telegram.

BY ARTHUR T. ABERNATHY, MANAGER WESTERN UNION TELEGRAPH COMPANY, JESUP, GA.

Few of the thousands of persons who send and receive telegrams realize the attention given to their messages from the moment they are written and filed for transmission. A pen or pencil and telegraph blank might lie idly alongside of each other for months—yes, even for years—without causing any comment, but the moment a telegram is created by the simple combination of these two utilities with the human interest of the sender added, that telegram becomes something more than a written note; it becomes alive, and is the centre of an intense interest and effort until it finally reaches the hands of the addressee.

From the moment the sender hands it across the counter to the clerk, it is literally pounced upon by a force of alert telegraph employes. The clerk quickly checks it and it is hurried to the operating room where a traffic chief assigns it to its proper wire for prompt transmission. The wire to which that particular message is assigned for transmission may at the moment be busy, but the message is not permitted to repose on the hook undisturbed. The operator seizes the key of the telegraph instrument and immediately another campaign of effort takes place to get it away on its route with the utmost dispatch. No matter how many messages that particular operator may have handled during the day, his utmost energies are again set in motion to get the message out of his jurisdiction, as we may call it, so that the Argus-eyed traffic chief, whose business it is to keep a constant watch on the time marked on messages in transit, does not make his life one unending burden if he permits that particular message to lie on the hook. The struggle often is marked with acrimony, for operators at other points along the line are equally insistent on the immediate dispatch of messages they have, and neither friendship nor favor counts in such cases. It is hammer, hammer, hammer, until the message is moved — and thus it is eagerly watched after by operator, traffic chief, and other employes, while the wire chief sits alert at the board to see that no wire trouble impedes its progress until it finally reaches its destination.

Nor does the message rest there. The delivery clerk seizes it; a copy is made for the records of the receiving office and away goes the message either by telephone, when the telephone is available, or by messenger—sometimes by both—until it resposes snugly in the hands of the person to whom it is addressed, when that message, to all intents and purposes, so far as the operator and dispatching force are concerned, is a thing of the past. But in case of non-delivery, incorrect address, or if for any other cause it has not been properly destined, it undergoes a reverse experience. The same treatment is accorded a "service" message regarding it, and so on until the message is permitted to rest, only after it has finally been disposed of to the satisfaction of the sender and receiver.

Perhaps there is nothing in the commercial world that is the subject of so much unrelenting activity as a telegram during its progress from sender to receiver. It is under the ceaseless guardianship of many persons, but its contents are always sacredly inviolate.

Commercial and Railway Telegraphy.

"The Modern Service of Commercial and Railway Telegraphy," is the title of a widely-known book originally written by Mr. J. P. Abernethy and brought up to date by experts. The information is imparted in the form of questions and answers, which is one of the most effective methods of teaching.

In this case the practical sides of commercial and railway telegraphy are thoroughly and comprehensively discussed, and a copy of the book should be very useful and valuable to one who is preparing himself for positions higher up.

It has been well said that one cannot know too much of his own business. Variety of experience of course is a great help in acquiring knowledge, but this kind of experience cannot be obtained by sitting in an office. It can, in such cases, however, be acquired by study, and in order to gain knowledge in this way care should be taken in the selection of books. This book is one of the few that should comprise the student's library. It covers the Morse system of telegraphy; the telegraph; commercial business; railway telegraphy; railway station service, etc., and goes a little into electric phenomena.

The price is $2.00 and copies can be mailed the same day the order is received. Address Telegraph and Telephone Age, 253 Broadway, New York, which is headquarters for all electrical books, and prompt attention is given to orders.

A 10,000-Volt Storage Battery.—At a recent meeting of the Röntgen Society in London, Mr. A. Campbell Swinton performed some experiments with a current from storage battery of 4,800 cells, giving a pressure of 10,000 volts. The cells were made of test tubes ¾ inches in diameter and four inches long, celluloid separators being used. Thirty years ago Warren De la Rue made a chloride of silver battery of 10,000 volts, and ten years ago Professor Trowbridge built a battery of 20,000 cells.

Telegraphers and telephonists should make a study of their professions. They can do this without loss of time by studying books on telegraphy and telephony. Telegraph and Telephone Age, 253 Broadway, New York, is headquarters for all electrical books published.

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The Funny Side of the Telegraph.

In our issue of March 1, under the heading, "What the Telegraph Says," we gave a few examples of telegraphic bulls. The manager of an office in a Western city has taken the matter so seriously that he has contributed his mite toward the general storehouse of fun and thinks others should do the same and thus lengthen the lives of their brethren who read the paper.

"Ship immediately one thousand light seeds at 75c. each," is the way it was received, but it was sent, "Ship immediately one thousand sight feeds at 75c. each."

"John Jones & Q," for "John Jones, Esq.," and "Buy one bug," for "Buy 10 sug." are other recent examples of telegraphic idiosyncrasies.

A commission house received the order: "Ship us immediately one barrel of strings and one-half barrel of pens." On repetition the message came back: "Ship us immediately one barrel of springs and one-half barrel of hens," which was more intelligible to the poultry dealer.

Day-Letter Tolls.

The following table shows the tolls for day-letters at different rates, which service was instituted by the Western Union Telegraph Company, March 1:

No. of Words	Rate of 20—1	Rate of 25—2	Rate of 30—2	Rate of 35—2	Rate of 40—3	Rate of 50—3	Rate of 60—4	Rate of 75—5	Rate of 100—7
1 to 50	.30	.38	.45	.53	.60	75	.90	1.13	1.50
51 " 60	.36	.45	.54	.63	.72	.90	1.08	1.35	1.80
61 " 70	.42	.53	.63	.74	.84	1.05	1.26	1.58	2.10
71 " 80	.48	.60	.72	.84	.96	1.20	1.44	1.80	2.40
81 " 90	.54	.68	.81	.95	1.08	1.35	1.62	2.03	2.70
91 " 100	.60	.75	.90	1.05	1.20	1.50	1.80	2.25	3.00
101 " 110	.66	.83	.99	1.16	1.32	1.65	1.98	2.48	3.30
111 " 120	.72	.90	1.08	1.26	1.44	1.80	2.16	2.70	3.60
121 " 130	.78	.98	1.17	1.37	1.56	1.95	2.34	2.93	3.90
131 " 140	.84	1.05	1.26	1.47	1.68	2.10	2.52	3.15	4.20
141 " 150	.90	1.13	1.35	1.58	1.80	2.25	2.70	3.38	4.50
151 " 160	.96	1.20	1.44	1.68	1.92	2.40	2.88	3.60	4.80
161 " 170	1.02	1.28	1.53	1.79	2.04	2.55	3.06	3.83	5.10
171 " 180	1.08	1.35	1.62	1.89	2.16	2.70	3.24	4.05	5.40
181 " 190	1.14	1.43	1.71	2.00	2.28	2.85	3.42	4.28	5.70
191 " 200	1.20	1.50	1.80	2.10	2.40	3.00	3.60	4.50	6.00

New York, March 1, 1911 B. BROOKS, General Manager

Telepost Company Closing Offices.

The Telepost Company recently closed some of its way offices between Boston, Mass., and Portland, Me., because it did not pay to keep them open. This action aroused so much newspaper talk and criticism, that we asked President H. Lee Sellers for an official statement regarding the situation. His reply is given herewith:

"We recently saw fit to close some of the way statons on the Boston-Portland line, because they were not only utterly unproductive, but could not possibly be made to pay until the completion of our line from New York to Boston will enable us to take their through business, at which time Telepost service will be renewed. We did this in the interest of our stockholders, as we did not feel it right to carry these offices at an expense to them after we saw that the extension from Boston would be somewhat delayed.

"The way some newspapers have rushed to the front in the attempt to make a sensational exploitation of this very judicious and proper business move on our part, is quite an interesting commentary on what we are 'up against.' Zealous to do what they can to injure the Telepost, those papers are serenely quiet concerning all the progressive work of the company.

"When we opened for business in Chicago, St. Louis, Kansas City, Omaha, Indianapolis, Louisville, and other cities in that vicinity, scarcely a line of notice was given to this very important achievement. When we gave out information of the fact that in the last few months we had secured over a thousand additional firms and corporations as customers in three cities alone, not a word appeared in recognition of this appreciation by business men of Telepost service and economy. Though for two years the Telepost has been sending 50-word day or night letters for 25 cents, the press said nothing about this remarkable service until the old companies were forced, by Telepost competition in the Middle West, to adopt the 'letter' but at higher rates. But when we shut up a few way offices so close to Boston that there is practically no telegraph business at all, 'enterprising' papers take the matter up and parade it with scare headlines. This is what the Telepost Company has been taught to expect. We have learned a good deal about 'opposition' tactics in the past two years, the mildest of which are insinuation and guarded misrepresentation."

Mr. Richard O'Brien, of Scranton, Pa., writes: "To me the Age is like the telephone, a delight and a necessity."

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Multiplex Telegraphy.

BY S. R. BEATTY, NEW YORK.

In my article on Multiplex Telegraphy, published in the issue of March 1, and referred to by Mr. John B. Taylor, in the issue of March 16, the calculations were made on the serial assumption, and a number of tests seemed to bear it out. Theoretically, the capacity is in multiple with the resistance and reactance. However, if we make calculations on this basis (which involves the use of trigonometric functions) we shall obtain values which are not at all in accord with this theory and are entirely different from the values which are present during operation. If we divide the circuit into sections and calculate from that standpoint, we will find that the capacity is not, strictly speaking, a multiple arrangement. The problem is exceedingly complex, no matter from what direction it may be approached.

In actual practice it may be observed that a circuit with a given capacity will stand a higher speed and record firmer signals than one half the length with a very small capacity and worked at the same speed. If the speed of the two circuits be increased it will be noticed the one having the smaller capacity will be the first to give very light signals and finally begin to "drop." This condition is always present in what is known as a "thin wire." If a circuit of this kind is worked at a high speed it is a well-known fact that the current may fall to such a small value that it will not actuate the armature of the relay.

In circuits having a small capacity (which does not necessarily imply a small mileage any more than a large capacity indicates a great mileage), it is possible for the capacity to be of so small a figure that the breaking of the circuit at each alternation causes the impedance to become so large that the current may fall even to zero. To work such circuits the frequency must be so low as to permit the circuit to be charged.

These are conditions which are actually encountered in practice and which would indicate that the serial assumption is nearer to the actual conditions existing on such circuits, than that of the capacity being in multiple. However, as already stated, the problem is very difficult and must be worked out for each circuit separately. It would also indicate that to get at the true conditions existing on multiplex circuits in operation, they must be studied from the basis of what they are, instead of what they are not, if the detrimental conditions existing therein are to be successfully combated and overcome.

Regarding the law of the inverse square, this subject has been gone into very exhaustively by the most eminent authorities who have proved that law, also that of the inverse cube. It is also voiced, although in a different manner, by Newton's Third Law.

In the formula given for calculating current it is of course understood that the capacity must be expressed in farads owing to the farad being chosen with respect to the volt and ampere, and while it is not shown, it is indicated.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER XLIX.

Why is the current on a line weakened in wet and foggy weather?

Does a battery or generator, supply the same amount of current under such conditions as in dry weather?

When a wire cannot be worked quadruplexed on account of leakage, how is it tested.

If, in testing a wire, the home end being grounded and the distant end open, the existence of a current is indicated on the ammeter, where does the current come from?

If the escape is near the home station and of ten milliamperes in value what does it indicate?

Is the measure of "escape" any criterion as to the workable value of the wire?

When two wires become crossed what is usually done in order to clear one of them?

In case this is a quadruplexed circuit what is the effect of this "opened" crossed wire upon the operation of the quadruplex?

In order to reduce the static capacity of the working wire what should be done with the crossed wire?

CHAPTER L.

What is counter-electromotive force as developed in the coils of a relay?

What is the effect of counter-electromotive force upon the current that produces it?

How is the counter-electromotive force in relay coils calculated?

What is the best means of reducing the counter-electromotive force?

How does a relay act when the counter electromotive force is reduced by special means, as compared with its ordinary action?

Why is it necessary to keep the ampere turns up to a certain point?

How should the relay coils be wound in order to reduce self-induction, or counter electromotive force?

Enumerate some of the advantages of winding relay coils in multiple.

Can multipled relays be worked satisfactorily on circuits containing relays wound in the usual way, that is, in series?

What's in a Name.—Adam Hamm is the name of an operator in an eastern city. This name may have two meanings.

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Organization of Telephone Pioneers.

The proposed organization of the telephone pioneers of America is meeting with enthusiastic support and the "pioneers" who are scattered all over the country are sending in their names for enrollment.

Suggestions have been submitted with regard to time and place for the first meeting, Boston being named on account of its being the birthplace of the telephone, and Niagara Falls, because the first telephone convention was held there. The meeting will be held during the summer or early fall, as this time of the year is considered the most preferable.

The tentative qualifications for membership in the association are: "Employment in the telephone service twenty-five years prior to date of application and continuously at any time thereafter for five years."

Following are the names of the telephone pioneers who have been so far heard from, together with the dates of their entry into the telephone service:

Adee, D. M., June, 1878; Adkins, W. H., 1878; Allen, A. M., Feb. 1, 1880; Allen H. E., May, 1885.

Bailey, Thos. B., Feb. 28, 1878; Baker, Ellis B., Jan. 31, 1878; Barton, Enos M., 1876; Barrett, John A., 1881; Barrett, A., May 1, 1883; Bawsell, E. E., Feb. 6, 1878; Berthold, V. M., Sept. 20, 1883; Bloodgood, F. S., April 14, 1880; Blake, J. T., March, 1882; Boutilette, H., 1879; Bradshaw, Thos. N., 1884; Brown, Joseph M., May 1, 1879; Buttrick, F. A., August, 1879; Butler, John K., 1878.

Cahill, John H., May 5, 1880; Caldwell, J. E., May 1, 1885; Campbell, A. S., August, 1885; Candee, Willard L., August 1, 1877; Canfield, Jas. F., December, 1885; Carney, M. J., July, 1879; Carty, J. J., 1879; Chapman, Wilson S., Nov. 1, 1879; Clark, E. A., April 1, 1883; Clark, E. N., July, 1880; Christie, J. W., July 12, 1884; Conn, F. W., Aug. 1, 1879; Crews, J. Wm., May, 1883; Culberson, J. N., April, 1878.

Denver, W. J., July 1, 1885; Depuy, A. B., Sept., 1883; Devenshire, Robt. W., August, 1877; Dodd, Amzi, Nov., 1886; Doolittle, Thos. B., September, 1877; Doolittle, Chas. B., July, 1878; Driver, W. R., 1880; Dwyer, T. J., 1881.

Eastabrook, W. N., September, 1879; Eddy, W. B., 1882; Egleston, Melville, 1885; Embler, A. H., May, 1882.

Farnsworth, J. E., 1885; Ferry, J. M., Sept., 11, 1886; Forbes, Frederick A., Oct., 1882; Foster, Geo. W., March, 1882; Freedy, B. L., Oct. 1, 1881.

Garvey, W. J., Sept. 1, 1880; Gates, C. A., 1885; Gentry, W. T., 1879; Ghegan, J. J., 1878.

Hall, E. J., Nov., 1878; Hall, Chas. E., April 1, 1884; Hanchett, W. D., 1879; Heep, W. G., Nov. 12, 1885; Hibbard, Angus S., July, 1881; Holmes, E. T., May, 1877; Hoover, Robt. B., April 1, 1881; Houston, Francis A., March, 1885; Hume, Leland, Oct. 16, 1885; Huntington, W. E., July 1, 1882.

Ingalls, S. C., December, 1886; Ingraham, Thos. L., Feb. 2, 1881.

Jacobs, W. J. C., May, 1884; Janke, C. A., July 10, 1880.

Keller, Jasper N., 1879; Keech, T. J., April 1, 1881; Kelleher, Chas. F., Oct., 1878; Knight, Frank B., May, 1880.

Ladd, J. W., 1878; Lane, M. L., 1885; Lewis, Fred'k P., July, 1882; Lloyd, B. F., 1883; Lockwood, Thomas D., July 25, 1879; Lohmer, Hardy T., April, 1883; Longley, Edmund W., Sept., 1881.

Mackenzie, Cecil W., April 1, 1879; Many, Augustus, Feb. 8, 1882; Martin, Wm. D., June 15, 1883; McComas, R. T., Sept. 1, 1878; McCulley, Harry G., July 1, 1881; McDaniel, Chas. W., May, 1879; McFarlane, Lewis B., July, 1879; McFarland, G. E., 1880; McLaughlin, R. J., May, 1882; McLeod, John D., 1886; Mehaffey, J. H., Sept., 1878; Milne, G. D., 1879; Moran, Jas. T., Sept., 1884; Murphy, D. J., Jan., 1881.

Nesbit, T., March, 1880; Nicholson, Chas. A., Nov., 1877; Nicholson, W. W., Jan., 1881.

O'Brien, Richard, 1877.

Paynter, W. D., Jan. 1, 1879; Pickernell, F. A., 1886; Pierce, Geo. Willis, Feb. 5, 1880; Pope, Henry W., April, 1877.

Raup, K., Oct., 1880; Reynolds, P. T., 1882; Roberts, A. P., Nov., 1880; Root, Chas. M., Jan., 1879.

Salt, A. L., July 7, 1881; Sargent, Wm. Dunlap, November, 1877; Schultz, H. J., Dec. 26, 1878; Scribner, C. E., 1878; Sherwin, Thos., March, 1883; Sherwood, E. F., June 10, 1879; Smith, Alonzo, March 16, 1880; Smith, Elmor A., Jan., 1882; Smith, Frank Eugene, Nov. 1, 1881; Snelling, H., 1885; Sperry, Walter N., Nov. 1, 1880; Sise, C. F., Jan., 1880; Skolsky, Phillip Jacob, 1881; Stork, H. L., June, 1879; Sunny, Bernard E., March 1, 1881.

Thayer, H. B., Jan., 1881; Truex, Chas. R., Sept., 1879.

Vail, Theo. N., 1878; Vail, J. Cummings, June, 1880.

Wallace, G. Y., 1883; Warner, Frank E., Dec. 1, 1879; Watson, H. P., 1881; Wainman, C. P., 1877; Wilder, H. W., 1881; Wiley, Geo. L., February, 1878; Wilson, Chas. H., 1877; Wilson, D. Leet, Jan. 8, 1877; Westbrook, W. T., April, 1878; Wood, F. G., 1877.

Yensen, P., Jan., 1884.

All communications relative to the proposed organization may be addressed to Mr. Henry W. Pope, or Mr. C. R. Truex, 15 Dey Street, New York.

The name of Mr. Enos M. Barton stands at the head of the list in point of date of entry, having entered the telephone service in 1876. No other name appears under that year.

Among those who entered in 1877, 1878 and 1879 are found several well known names, as follows:

1877—Willard L. Candee, R. W. Devenshire, T. B. Doolittle, C. A. Nicholson, Richard O'Brien, Henry W. Pope, W. D. Sargent, C. P. Wainman, Chas. H. Wilson, D. L. Wilson and F. G. Wood.

1878—J. N. Culberson, J. J. Ghegan, E. J. Hall, C. F. Kelleher, J. W. Ladd, R. T. McComas, C. E.

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Scribner, Theo. N. Vail and W. T. Westbrook, Wiley, G. L.

1879—H. Boutilette, F. A. Buttrick, J. J. Carty, F. W. Conn, W. T. Gentry, W. D. Hanchett, Jasper N. Keller, T. D. Lockwood, C. W. Mackenzie, C. W. McDaniel, L. B. McFarlane, G. D. Milne, W. D. Paynter, C. M. Root, E. F. Sherwood, H. L. Stork, C. R. Truex, F. E. Warner.

The Telephone.

Telephone Dividend.—The American Telephone and Telegraph Company has declared the regular quarterly dividend of 2 per cent., payable April 15.

Increase of Capital.—The capital stock of the Consolidated Telephone, Telegraph and Electric Company, Tucson, Ariz., has been increased to $8,000,000 to provide for future expansion.

Long Distance Telephony in Europe.—It is stated that a trial is to be made of telephonic communication between London and Amsterdam, Cologne, Frankfurt, Basle and Zurich, by way of Paris and some other continental city.

New Telephone Building for Portland, Me.—The New England Telephone and Telegraph Company is erecting a new building in Portland, Me. It will be four stories high and will be the headquarters for the new district.

Mr. George A. Campbell, research engineer of the American Telephone and Telegraph Company, will read a paper on "Cisoidal Oscillations" at the Congress of Technology, to be held in Boston, April 10 and 11.

The Telephone Society of Washington.—At the meeting of the Telephone Society of Washington, D. C., March 2, Major George Owen Squier, Signal Corps, U. S. A., talked to the society on the subject of "Multiplex Telephony and Telegraphy."

Underground Trunk Telephone Lines in Australia.—Underground trunk telephone lines between Adelaide and Port Adelaide, Australia, are now in operation. The length of the cable is eight miles 3,485 feet; the length of wires is 2,700 miles 3,960 feet.

New Orleans Telephone Employes Meet.—The New Orleans Employes' Association of the Cumberland Telephone and Telegraph Company held its regular meeting on February 15. It was decided to give a boat ride for the benefit of the sick and relief fund. After the meeting a musical programme was rendered.

New England Telephone Employes' Association.—Prof. W. L. Hooper, of Tufts College, gave a talk on the fundamentals in electricity before the Boston Plant Chapter of the Telephone Employes' Association of New England on March 24. At the meeting of the Chapter on April 28, Mr. G. K. Heyer will deliver an address on "Telephone Train Dispatching."

Tent for Linemen at Work.—During a recent cold snap in Knoxville, Tenn., the telephone companies used a portable canvas tent, which fitted over the cable boxes and wires on telephone poles, effectually protecting the linemen while at work. The tent could be let down over the top of the pole and could be run from one pole to another by means of a pulley.

A Successful Woman Organizer.—Mrs. Anne McElroy Brett is a prominent manager and organizer of electrical properties in western Texas. She is president of the Southern Independent Telephone and Telegraph Company, and is president and general manager of the Brett Construction Company. She is known as the "telephone queen of the Southwest," and the companies she has organized represent a capital of over $500,000.

Pacific Telephone and Telegraph Company Election.—At the annual meeting of the Pacific Telephone and Telegraph Company and the Sunset Telephone and Telegraph Company, held in Martinez, Cal., March 1, the following officers were elected: President, Mr. Henry T. Scott; first vice president, Mr. E. C. Bradley; second vice president, Mr. E. J. Zimmer; third vice president, Mr. Louis Glass; secretary-treasurer, Mr. F. W. Eaton. These gentlemen will constitute the board of directors for the two companies for the next year.

Telephone Consolidation in New York State.—It is reported that negotiations have been started by the Friendship Telephone Company of Syracuse, N. Y., representing the Bell interests, for the purchase of the Rochester Telephone Company, with independent and affiliated lines. The Syracuse company has made an offer to purchase the outstanding stock and bonds of the Rochester Telephone (Home) Company, the Rochester, Syracuse and Utica Telephone Company, and the Utica Home Telephone Company, comprising the system of independent telephone lines operating in Rochester, Syracuse, Utica and adjacent places.

Wanted, a Name for a Telephone Message.

The New York Telephone Company desires to adopt a word to signify a telephone message. The *Telephone Review* publishes a long list of words suggested; some of them are good but many of them are quite the contrary. Among the names given in the list are: Audigram, Bell-gram, Bluebell, Communigram, Grahambell, Parlegram, Phonogram, Telcall, Televerb, Verbaphone, Wireword, Wordophone. It has been suggested that the public vote on the question.

Public Service Legislation.

A bill has been introduced in the Minnesota House of Representatives to limit the charges by telegraph companies for messages within the State to twenty-five cents for ten words, and two cents for each additional word over ten.

The bill introduced in the Oregon legislature fixing the liability of telegraph and telephone companies for delayed or incorrect messages has been stifled in committee.

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International Congress of the Applications of Electricity at Turin in September.

An International Congress of the Applications of Electricity will be held at Turin, Italy, from September 9 to 20, on the initiative and under the auspices of the Italian Electrotechnical Association and of the Italian Electrotechnical Committee, during the period of the International Exhibition of Industry and Labor. The first meeting of the International Electrotechnical Committee will be convened at Turin from September 11 to 16, and the official delegates of the Electrotechnical Committees of several nations will be assembled there.

The president of the Organizing Committee is Mr. L. Lombardi, and the secretaries are Messrs. G. Semenza and C. A. Curti, 10 Via San Paolo, Milan. At a meeting of this committee on December 28 last a programme was decided upon. The subscription for membership has been fixed at five dollars (25 lire) which is to be paid in advance. Membership carries with it the right to attend all meetings of the Congress and of the various sections, to vote and to receive a copy of the printed transactions.

In addition to the papers offered by the official reporters the Committee of Organization will consider papers or proposals presented by members or by any electrical association. Papers may be written in French, English, German or Italian accompanied by a translation or a summary in French. All papers will appear in the transactions of the Congress in their original language. Those in English, German and Italian will be accompanied by a French translation or summary.

Among the subjects to be presented for discussion at the Congress will be the following:

Converters, rectifiers and motor-generators; Application of electricity to submarine boats; Long-distance wire telephony; Wireless telephony; Automatic telephone exchanges as a means of economy and improvement in telephonic communication in large cities; Research on secrecy in wireless telegraph; Comparative study of the direct and indirect methods of taxing electricity in different countries; The various systems of multiplex telegraphy.

It is proposed to hold an international telegraph tournament some time during the exposition, with expert telegraphers from various countries as participants. Definite plans have not yet been announced, but they may be expected soon. This tournament was referred to at some length in our issue for July 1, 1910, also in the issues for January 16 and March 1 of this year.

The Messenger Situation.

BY HARMAN D. JONES, SAN FRANCISCO, CAL.

The messenger situation has not advanced in proportion to the great strides in recent telegraphic development, and the study of the boy problem has been largely overlooked and by many managers almost completely ignored. No one who takes into account the forces that make for the best, whether in character or conduct, can be insensible to the importance of the proper training of the future telegraphers, beginning with the boy when he first enters the service.

A boy's mind is something impressionable; his earliest impressions are likely to be his deepest and most enduring. Then is the time to inculcate right ideas and honest ambitions. Nothing is more important than to have the conditions and surroundings by which these first impressions are created, sources of the highest inspirations. It must be acknowledged that the average telegraph office and present-day office manager are not adequately recognizing the responsibilities or improving the opportunities before them to properly educate and advance the messenger. The commanding position to which the present day telegraph service has soared has necessarily lifted the messenger boy into one of large importance, and it is gratifying to know that thoughtful people in the telegraph service are now seeking to lift the messenger to a higher plane. The time has come when the almost general dissatisfaction with past methods demands earnest effort to correct them. There are doubtless many difficulties in the way of accomplishing desired results and the work will demand expert and trained intelligence, but our wise leaders will no doubt prove themselves masters of the situation.

The messenger boy comes to us fresh from school and thus takes his first and most serious step in his business life. It is a period when he begins to realize the moral problems that confront him; when he finds himself drifting from the earlier influences of his home. He tries to adjust himself to the world as he sees it, and no doubt he feels more keenly than we realize the big break between his former ideals and his first rough impressions of actual experience. Here is where our great responsibility begins, not only in laying a good foundation for future leaders in great enterprises, but in seeing to it, by our example and interest in the personal welfare of the youth, who has chosen the telegraph office as the stepping stone to a business career, that he is guided in the right direction in order that he may ultimately attain to some desirable goal. As the opportunity in the telegraph field is greater today than ever before there is no longer any reason why the young men should seek other fields of labor, and it is hoped that the discussion of this vital topic will result in the adoption of some uniform plan whereby the standard and efficiency of the messenger force will be elevated and liberal inducements afforded such as will make it worth while for messengers to remain in the service with the hope of reaching positions of prominence and trust.

Bowling Match by Telegraph.—An inter-city bowling match will be held by telegraph on April 22 under the auspices of the New York Athletic Club. A number of athletic clubs throughout this country and Canada have entered. The bowling will commence at different hours in different cities, so that all the results will be received at the New York Athletic Club at about the same time.

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KERITE

Insulated Wires and Cables

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

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

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

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

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

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

KERITE INSULATED WIRE AND CABLE COMPANY

INCORPORATED BY W. R. BREXEY

Sole Manufacturer

Hudson Terminal, 30 Church St.

NEW YORK

Western Representative

WATSON INSULATED WIRE CO.

Railway Exchange, CHICAGO, ILL.

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The Railroad.

Train Despatchers' Convention.—The next convention of the Train Despatchers' Association of America will be held in Baltimore, June 20.

Train-Controlled Highway Signal.—Mr. R. D. Peters, of Knox, Ind., has been granted a patent (No. 985,628 issued February 28) on a train-controlled highway signal.

Overhead Wire Crossings in Indiana.—The bill passed by the Indiana legislature regulating the construction of telephone and telegraph wires across railroad and interurban electric railway tracks has been signed by the Governor.

Mr. W. H. Johnson, assistant superintendent of the Winston-Salem district of the Atlantic Coast Line, at Florence, S. C., began his business career as a telegrapher on the Shenandoah Valley Railroad in 1889. He was born at Charlestown, W. Va., October 26, 1871.

Mr. F. V. Worden has been transferred from Shopton, Iowa, to La Junta, Col., as manager and wire chief for the Atchison, Topeka & Santa Fe Railway. Mr. O. O. Ouderkirk, of Newton, Kan., has succeeded Mr. Worden at Shopton as wire chief and manager for the same company.

Mr. W. J. Holton, formerly superintendent of telegraph of the Chicago and Western Indiana Railroad Company, Chicago, Ill., and in 1902-3, vice-president of the Association of Railway Telegraph Superintendents, but for the past four years identified with one of the national banks at Englewood, Ill., died recently. Mr. Holton was born in 1859 and was well known in railway telegraph circles.

Test of Typewriter Telegraph.—The Morkrum printing telegraph system is being tested on the Chicago, Burlington & Quincy Railroad between Chicago and Galesburg, Ill. Messages are transmitted by the manipulation of a typewriter keyboard and they are received automatically on a like machine. This is the same system that is now being used on the Postal Telegraph-Cable Company's lines between New York and Boston.

More Telephone Dispatching on Canadian Pacific.—Authority has been given for the installation of another telephone dispatching circuit between Medicine Hat and Calgary, on the Canadian Pacific Railway, a distance of 180 miles. When this is installed there will be a total of 3,955 miles of telephone train-dispatching circuits on the Canadian Pacific Railway, the whole of the main line being covered except from Kamloops to Vancouver, 251 miles, single track; Winnipeg to Fort William, 419 miles, double track, and Montreal to Smiths Falls, 128 miles, double track, besides a number of branches. Mr. W. J. Camp, Montreal, Can., is electrical engineer of the Canadian Pacific Railway's Telegraphs.

The Boston Meeting of Railway Telegraph Superintendents.—The next meeting of the Association of Railway Telegraph Superintendents, which will be held at Boston, June 19-23, promises to be the most interesting and important ever held by that association. Many new things are coming to the front in the operation of railways which call for attention and action on the part of the operating officials. The use of the telephone in the dispatching of trains has been brought about by this association and there seems to be no end to its possibilities. The Boston meeting will probably give an impetus to the Turner Monument project that will carry it forward to a successful issue. Mr. S. A. D. Forristall, superintendent of telegraph of the Boston and Maine Railroad, Boston, is chairman of the committee of arrangements, and he is preparing an excellent programme for the meeting. The entertainment features will also be of extraordinary interest. Mr. P. W. Drew, Room 306, 135 Adams Street, Chicago, is the secretary of the Association, and will be glad to give further information regarding the meeting.

Protective Devices for Railway Circuits.

The special High Tension Wire Crossings committee of the Association of Railway Telegraph Superintendents, the chairman of which is Mr. G. A. Cellar, superintendent of telegraph of the Pennsylvania lines west of Pittsburg, is prosecuting its investigations into the matter of protective devices for railway telegraph and telephone circuits.

Thus far, the committee has been unable to find any single device that may be depended upon absolutely, particularly from the effects of a lightning stroke. However, the employment of a vacuum lightning-arrester at each of the several stations is found to safeguard the railroad telephone against trouble much better than the ordinary telephone line is guarded, for the reason that the apparatus in question strung out, as it were, along the line, acts like a drawn-out picket fence of grounds which tend to prevent the concentration of the lightning discharge at any one point and so dissipate its energy.

Another type of arrester has also attracted favorable attention of the committee, differing from the vacuum form in that no open space is permitted between the line and the ground, a solid block of special material being brought into contact with the line and ground terminals by means of carbon plates secured to the two surfaces thereof.

The committee is still at work on the problem, and the thoroughness with which its investigations are being conducted gives promise of satisfactory results.

Washington Meeting of Eastern Division of Railway Telegraph Superintendents.

The quarterly meeting of the Eastern Division of the Association of Railway Telegraph Superintendents was held in the committee room of the Washington Terminal Railway, Washington, D. C., Mar. 22, with a large attendance.

At the morning session the following subjects were discussed:

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Standard form for reporting troubles and repairs made on telephone train-dispatching circuits and apparatus.

Destruction of telegram records of steam roads on account of the order of the Interstate Commerce Commission.

Circular of vice-president G. W. E. Atkins of the Western Union Telegraph Company in regard to the illegal use of wires for messages other than railroad business under business franks.

New standard railway operating agreement.

A committee, consisting of Mr. W. F. Williams, of the Seaboard Air Line, chairman, Mr. L. B. Foley of the Delaware, Lackawanna & Western Railroad and Mr. E. P. Griffith, of the Erie Railroad, was appointed to consider the subject of destruction of telegram records.

The entire afternoon was taken up by the executive session.

Mr. E. P. Griffith, superintendent of telegraph, Erie Railroad, New York, and chairman of the Turner Monument Fund, did some effective missionary work and aroused much interest in behalf of the project.

The following named superintendents of telegraph were present: Mr. Charles Selden, Baltimore and Ohio Railroad, Baltimore, Md.; Mr. W. F. Williams, Seaboard Air Line, Portsmouth, Va.; Mr. W. H. Potter, Southern Railway, Washington, D. C.; Mr. E. P. Griffith, Erie Railroad, New York; Mr. B. F. Thompson (telephone inspector) Baltimore and Ohio Railroad, Baltimore, Md.; Mr. E. W. Day, (assistant superintendent of telegraph) Baltimore and Ohio Railroad, Baltimore, Md.; Mr. L. B. Foley, Delaware, Lackawanna and Western Railroad, New York; Mr. W. P. Cline, Atlantic Coast Line, Wilmington, N. C.; Mr. G. A. Cellar, Pennsylvania Lines West of Pittsburg, Pittsburg, Pa.; Mr. C. L. Lathrop, Pittsburg, Shawmut and Northern, Angelica, N. Y.; Mr. W. C. Walstrum, Norfolk and Western, Roanoke, Va.; Mr. J. T. Nolan, (chief operator), Washington Terminal, Washington, D. C.; Mr. W. F. Taylor, Pennsylvania Railroad, Altoona, Pa.; Mr. C. M. Lewis, Philadelphia and Reading, Reading, Pa.; and Mr. C. W. Bradley, acting superintendent of telegraph, Chesapeake and Ohio, Richmond, Va.

Other gentlemen present were Messrs. Hy. Homer, and G. W. Peck, of the American Telephone and Telegraph Company; Mr. W. F. Crowell, New York Telephone Company; Messrs. H. E. Merrill and W. E. Harkness, United States Electric Company, New York, and Mr. G. K. Heyer, Western Electric Company, New York.

Hours-of-Service Law.—The United States Supreme Court has decided that railroads employing telegraph operators for six hours, then after an interval, three hours more, do not violate the Federal "hours of service law," of 1907. The government claimed that the nine hours of service must be continuous.

Pennsylvania State Railroad Commission.—A bill has been introduced in the Pennsylvania legislature to create a public service commission to be known as the Pennsylvania State Railroad Commission. The definition of the term "common carrier" includes telegraph and telephone companies, besides electric railways, steam railways, etc.

Municipal Electricians.

Mr. A. C. Farrand, city electrician of Atlantic City, N. J., who has acceptedly filled that office for many years finds himself out of a position owing to a change in politics in that city.

Police Telegraphs in Kansas City.—Mr. B. C. Halderman, special engineer for the Kansas City, Mo., police department, has recommended the expenditure of an additional $10,000 to put the police telegraph system in a proper condition, asserting that it will then save the city that amount every year.

Meeting of Executive Committee of Municipal Electricians.—The executive committee of the International Association of Municipal Electricians, will convene in St. Paul, Minn., on April 5 to select the dates for the next annual convention which is to take place in that city in September, and to transact much important accumulated business. The committee consists of S. W. Manning, chairman, St. Paul, Minn.; C. S. McCosker, Mobile, Ala.; Jos. B. Smith, Rochester, N. Y.; R. A. Smith, Norfolk, Va.; W. H. Thompson, Richmond, Va., W. R. Arbuckle, Bayonne, N. J.; A. L. Pierce, Wallingford, Conn.; Robt. Quain, St. Louis, Mo.; Louis Gascoigne, Detroit, Mich.; with H. C. Bundy, of Watertown, N. Y., president, and C. R. George of Houston, Tex., secretary, ex-officio members. The officers and a majority of the executive committee will be present at St. Paul on this occasion.

Improvement in Typewriter Manifolding.

Mr. William England, for many years manager of the Central and South American Telegraph Company and the Mexican Telegraph Company in Mexico, Colombia and Peru, has invented a new process for making duplicate copies of typewritten messages, etc. He employs a special carbon paper on a vertical double spool arrangement attached to the typewriter over the cylinder. This enables a front and back copy to be obtained at every stroke of the typebar, the duplicate being recorded on the back of the second blank or sheet of paper. Two blanks are printed on one sheet and fed folded into the typewriter, the ribbon making the record on the front blank in the regular way and the special carbon at the back making the duplicate copy. By this method there are no loose sheets of carbon paper to handle and a great saving of time is effected in handling messages. Mr. England is now in New York introducing his new manifolding process.

Telegraph and Telephone Age is headquarters for all electrical books.

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The Turner Monument Fund.

New interest is being awakened in connection with the Turner Monument project and there is good reason to believe that subscriptions will come in more rapidly henceforth.

The sending of the first telegraphic train order opened a field of operations in railroading in this country that cannot be measured in importance, and the event was fraught with such far-reaching results that it is to be commemorated in stone and bronze at the spot where it occurred. This was at Turner, N. Y., in the autumn of 1851, and the message was sent by Charles Minot, general superintendent of the Erie Railroad.

Contributions to the fund are invited from all railway and telegraph men throughout the country. The movement has the official endorsement of the Association of Railway Telegraph Superintendents and the Old-Time Telegraphers and Historical Association. The cost of the proposed monument will be about $3,000, and one-third of this amount has been subscribed. The following named gentlemen constitute the committee in charge of the monument fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden,, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

Mr. J. N. Abbott, former general ticket and passenger agent of the Erie Railroad, who was a personal friend of Charles Minot, sends the following interesting communication about that gentleman:

"I have read with lively interest the article in the March issue of the 'Erie Railroad Employes' Magazine,' regarding the proposed Telegraph Monument to be erected at Harriman, N. Y., on the site of the old Turner's 'Un' station, and beg to participate therein (herewith enclosed) to the extent that individual subscription is limited.

"I entered the service of the 'Old Erie' in April, 1861, as a clerk in the office of Charles Minot, general superintendent, and in the following year was acting chief clerk. Mr. Minot and L. G. Tillotson, superintendent of telegraph, became my personal friends.

"In the 'Ya' headquarters telegraph office, Erie Building, New York, at that time, A. N. Aplin was chief operator. He was succeeded by W. J. Holmes, who became the successor of Mr. Tillotson as superintendent of telegraph. Scott M. Kress was operator at Turner's and graduated thence to the Atlantic and Great Western Railroad as superintendent of telegraph under general superintendent H. F. Sweetser.

"A word about Mr. Minot's personal method of using the wires in sending instructions to his subordinates on the road may be interesting. His every message was written by himself—in ink—and in his bold round hand. After transmitting the message the operator noted thereon the time and returned it to Mr. Minot's desk; the message was then copied in the impression book and the original mailed, so that if there had been any error by wire it would thus be rectified; in any event the instructions would thus be reinforced. He used to make sure about his most important messages by adding the cabalistic instructions: 9. 27. 31. 35.

"The writer continued with the 'Old Erie' until December, 1886, then resigning his office as general ticket and passenger agent to become chairman of the Western States Passenger Association, Chicago."

Mr. John C. Haring, of Piermont, N. Y., is an old railroad man and a contemporary of Mr. Minot. "Many times," Mr. Haring states, "Mr. Minot rode with me on special trains, regular passenger trains and on freight trains. One time, on a special car, he had with him assistant general superintendent Joe Guppy, L. G. Tillotson, then superintendent of telegraph, and a number of division superintendents including J. J. Lawrence, Mr. Reddington, Horatio Brooks, of the Brooks Locomotive Works, W. J. Holmes, who later became superintendent of telegraph, and others. While they were eating lunch Mr. Minot called me aside and said, 'The moment I get up from the table you have the train ready to start, as I want to play a joke on these fellows.' The moment he stepped on the car the train was pulled out and only a portion of the party caught it. The others had to run about half a mile, and Mr. Minot was very much amused.

"Mr. Minot was always ready for a good meal with 'Jim' Turner and his party," Mr. Haring says in conclusion.

In the March number of the Erie Railroad Employes' Magazine is printed some interesting matter regarding the monument. An old document was discovered recently which throws considerable light upon conditions in the early days of railroad telegraphy. It was a report of Mr. L. G. Tillotson, then (August 1, 1857), superintendent of telegraph to Charles Moran, president of the Erie Railroad. It shows that, in the six years following 1851, telegraphic train despatching had come to be an established fact over the entire Erie system of that day, for the original wire was divided into sections to correspond with each division of the road. It was the growth of the seed planted at Turner by Mr. Minot, when he issued his famous order, that caused the cutting up of the original Jersey City-Dunkirk wire, into the four division wires, and this made a second wire a necessity."

The contributions toward the fund received up to date are as follows:

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Previously acknowledged, $974.25. O. C. Greene, Minneapolis, Minn., $1.00; Alex. Conley, Baltimore, Md., $.75; W. W. Bevans, Baltimore, Md., $.75; Kerite Insulated Wire and Cable Company, through Mr. R. D. Brixey, president, $50.00; Wm. Bennett, Wilmette, Ills., $5.00; John C. Haring, Piermont, N. Y., $1.00; Thos. Rodger, Montreal, Can., $1.00; A. D. Thompson, Mt. Vernon, N. Y., $1.00; C. A. Allen, Galion, Ohio, $5.00; F. J. Moser, Youngstown, Ohio, $5.00; E. W. Batchelder, Meadville, Pa.; $5.00; W. A. Baldwin, Huntington, Ind., $5.00; J. M. Barrett, Jersey City, N. J., $5.00; John N. Abbott, New York, $1.00; Clarence Kent, Paterson, N. J., $.25; W. H. Burke, Paterson, N. J., $.50; John Adams, Kearney, N. J., $.50; Geo. Kent, Paterson, N. J., $.25; Edward Fenwick, Paterson, N. J., $.50; W. Marshall, Toronto, Ont., $1.00; F. C. Robertson, Toronto, Ont., $1.00; C. L. Lathrop, Angelica, N. Y., $2.00; C. B. Epworth, Angelica, N. Y., $1.00; J. N. Thompson, Angelica, N. Y., $1.00; B. S. Dunn, Angelica, N. Y., $.50; J. D. Beaver, Angelica, N. Y., $1.00; F. E. Benson, Angelica, N. Y., $1.00; Standard Underground Cable Co., Pittsburg, Pa., $25.00; J. D. Brown, Cleveland, O., $4.00; F. W. Crowell, New York, $5.00; G. W. Peck, New York, $5.00; M. H. Homer, Philadelphia, Pa., $5.00; W. F. Williams, Portsmouth, Va., $2.50; W. P. Cline, Wilmington, N. C., $2.50; C. W. Bradley, Richmond, Va., $1.00; Craig Graves, New York, $1.00; A. J. Stone, New York, $1.00. Total, $1,123.25.

Radio-Telegraphy.

Wireless Telegraphy from Eiffel Tower.—The military wireless station at the Eiffel Tower in Paris has succeeded in transmitting prearranged, but weak and intermittent, signals to the Marconi station at Glace Bay, Canada.

United Wireless Meeting Postponed.—The annual meeting of the stockholders of the United Wireless Telegraph Company, which was to have been held in Portland, Me., March 14, has been postponed until June 13 because of an injunction obtained by minority stockholders.

Wireless Telephone Company Bankrupt.—Mr. Jesse Watson has been appointed receiver of the Radio-Telephone Company in bankruptcy proceedings filed by creditors. The company is a New Jersey corporation with a stock issue of $2,000,000 and was organized to exploit a wireless telephone invented by Mr. Lee de Forest.

Mr. Neil McAlester McIntyre, aged 30 years, manager of the Marconi Wireless Telegraph station at Virginia Beach, Va., died on March 13 of typhoid fever. He was a native of Scotland, and had a wide experience in the wireless field, being one of the pioneers. He was well known in the wireless profession throughout the world having traveled extensively in the Marconi service.

Wireless Service to Ships at Sea.—Arrangements have been 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. The Marconi station at Poldhu has a range of about 1,500 miles, and should the ship to which the message is addressed have passed beyond this range, the telegram will be forwarded by telegraph to the Marconi Company's long-distance station at Cape Cod, Mass., and thence transmitted to the ship.

New System of Wireless Telegraphy.

A new system of wireless telegraphy and telephony has been invented by Dr. R. Goldschmidt, of the Darmstadt (Germany) Technical High School, which makes use of a specially constructed generator which produces the necessary electrical oscillations directly, and without sparks or arcs. This high-frequency machine delivers alternating currents whose direction is declared to change over 100,000 times per second, and as soon as the telegraph key is closed the waves pass direct into the transmitting network. It is claimed that the system places no limit upon the distance over which messages can be sent, and that its working is independent of the daylight and the conditions of the weather. The machine gives in the form of electric waves an output corresponding to about 17 h.p., and requires for this a generator of about 21 h.p., showing an efficiency of 80 per cent. According to the inventor, there is no difficulty in the way of constructing machines of 80 h.p., 100 h.p., or even greater power.

Bronze Tablet to Commemorate the United States Military Telegraph Corps from Allegheny County, Pa.

Brief reference was made to this subject in our March 16 issue and we had hoped to be able in our present number to give further particulars as to the date fixed for the unveiling of the bronze tablet now almost completed and which is to be permanently installed some time in April in the Soldiers' and Sailors' Memorial Hall in Pittsburg. The committee in charge of the matter, however, has been prevented so far from selecting a day because of the fact that the anniversary of Founders' Day of the Carnegie Institute at Pittsburg occurs on Thursday, April 27, at which time Mr. Carnegie will be present. In our next issue, however, we will announce the final plans of the committee. As this function will mark the fiftieth anniversary of the founding of the Military Telegraph Corps, it is expected that the celebration will excite very great general interest on the part of the two hundred survivors of the corps, particularly of the sixteen survivors out of forty-one from Allegheny County. These survivors are Messrs. Joseph W. Boyd, David H. Bates, Andrew Carnegie, Albert B. Chandler, Capt. Thomas B. A. David, Charles W. Jaques, Major Jos. O. Kerbey, George A. Low, Theodore E. Moreland, Edward W. McKenna, James H. Nichols, George W. Perkins, J. William Pope, Jesse H. Robinson, J. A. Torrence and Robert F. Weitbrec.

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LETTERS FROM OUR AGENTS.

PHILADELPHIA, WESTERN UNION.

Mr. George Youtz, formerly of the Lebanon, Pa., office is now employed by the Reading Railroad in this city. Mr. Youtz was a student at Lebanon and after graduating was given an appointment as operator at the Reading Terminal for the Philadelphia, Reading and Pottsville Telegraph Company, which is operated in connection with the Reading Railroad. This telegraph company is a feeder for the Western Union and has table room and operators in the Western Union office to facilitate the handling of business.

The telephone department is being installed in a separate room, adjoining the bookkeeping department. The operators will thus be removed from the noise and confusion of the bookkeeping department.

PHILADELPHIA, POSTAL.

Mr. Wm. Sullivan has been transferred to Atlantic City, N. J., for the Easter and Summer rush.

Mr. C. E. Nelson of the Wright Printing System, has returned to New York. Mr. Harry Gage is in charge of the machine now.

NEW YORK, POSTAL.

All the pneumatic tubes have been removed from the gallery to the operating room floor, thereby doing away with the relaying of carriers on the gallery. By cutting out this extra handling the service throughout the room and to the outside tube offices has been considerably quickened.

The Lamson carrier system is now in operation between the two terminal route desks at each end of the operating room. This improvement also quickens the service, and at a reduced cost.

The Postal Electric Club, New York, now has 49 members, and much interest is taken in the work. It meets every Thursday night, and Mr. Donald McNicol, of the electrical engineers' office, is the instructor.

NEW YORK, WESTERN UNION.

Mr. Walter J. Williamson, for the past 27 years a transmitting operator in the Commercial News Department, has been retired on a pension. He has been absent from duty since February 15 on account of illness.

"Send Me a Night Letter, Dearie," is the title of a piece of music composed by Mr. Barrington L. Brannan, a well-known telegrapher at 195 Broadway, New York, and dedicated to Mr. Theo. N. Vail, president of the Western Union Telegraph Company, "originator of the night letter." On the front cover there is a fac-simile of a night letter, on a standard blank. The message is cleverly designed and is in harmony with the idea. For instance, it was sent by "Me" and received by "U." It is dated February 14, St. Valentine's day, and originated at Loveland, Iowa, via Honey Creek. It is addressed to "Dearie, Friendship, N. Y.," and the message, being the words of the chorus, contains fifty words.

Besides the reproduction of the message the front cover contains the head of a handsome girl printed in colors. The idea and its execution are certainly very unique. The price of this music by mail is 17 cents per copy. Mr. Brannan has an advertisement elsewhere in this issue.

Obituary.

Nathaniel Thayer, a well-known capitalist of Boston, died in that city March 21. Deceased was a director of the American Telephone and Telegraph Company and of other large corporations.

Edward D. L. Sweet, aged 86 years, a prominent telegraph official forty years ago, died in Oak Park, Ill., March 18. In his early youth he became a telegraph operator and was subsequently division superintendent of the Illinois and Mississippi Telegraph Company, vice president of the Atlantic and Pacific Telegraph Company and superintendent of the Western Union Telegraph Company, at Chicago, He retired from business in 1887. He was born at Virgil, N. Y., and went to Illinois with his parents in 1829, where he always resided. In the middle seventies Mr. Sweet was the general manager of what was known as the Sweet lines, a system of telegraph wires connecting various Boards of Trade, over which probably the fastest telegraph service ever conducted in this country was carried on between Chicago, Milwaukee, St. Louis, Toledo, Cincinnati, Buffalo, New York, Baltimore, and other cities. The transmission of over 100 messages an hour was considered ordinary work, and none but the cream of the profession were permitted to man the Sweet wires.

David H. Moffat of Denver, Col., one of the best-known railroad men and financiers in the country, died suddenly in New York on March 18. He was born at Washingtonville, N. Y., in 1839, and went to Colorado in 1860. He was the manager of the first telegraph office in Denver, yet he was not an operator. The way he came to occupy this position was an unusual one. When the overland telegraph lines were built in the early sixties, Julesburg was the only point in Colorado that was touched by the telegraph. Mr. Moffat who had large interests in the vicinity of Denver, which place was then practically unknown, desired to have telegraph connection with that place. He arranged with the telegraph officials to open a branch office in Denver, in his book store. When a person wished to send a telegram, they left it and the cash for tolls, with Mr. Moffat, who would send it to Julesburg, 200 miles away, by the first stage. From Julesburg it would be telegraphed to its destination. Messages were received at Mr. Moffat's Denver office in like manner. In 1862 Mr. Moffat and a few other wealthy business men subscribed $35,000 and had the telegraph line extended from Julesburg to Denver, and on Oct. 10, 1863, the first message was sent direct from that city.

Any book on electrical subjects can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York.

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New York Telegraphers' Aid Society Election.

The annual election of the New York Telegraphers' Aid Society took place March 27, with the following results: President, R. J. Marrin; vice-president, A. M. Lewis; treasurer, T. M. Brennan; financial secretary, C. A. Kilfoyle; recording secretary, Miss M. E. Saunders; executive committee, to serve one year, Edw. J. Oakley, John F. King, J. F. E. Hopkins, J. F. Zeiss, H. T. Tepe, W. H. Brahe, D. H. DeBaun; to serve two years, F. J. Sheridan, C. J. Lemaire, W. W. Price, Miss S. Dougherty; to serve three years, Edw. Mesler, E. E. Brannin, Edw. F. Howell, H. M. Heffner. Auditors, F. J. Nurnberg, J. F. E. Hopkins, H. M. Heffner.

At the annual meeting of the Society on March 29 various amendments to the constitution were adopted.

R. W. Martin Fund.—"A. T." has sent us $1 to be turned over to Mrs. Robert W. Martin, whose husband, the well-known old-time telegrapher, is helpless from the effects of a paralytic stroke received several years ago. Mrs. Martin, in acknowledging the receipt of this contribution, says: "I had just paid out my last dollar to the gas company, as they were going to close the meter, so you see this remittance couldn't have been more appreciated than at this time." Mr. Martin is gradually losing the power of speech, and his reason, and is very deaf.

T. M. B. A. Assessments.—Assessments Nos. 521 and 522 have been levied by the Telegraphers' Mutual Benefit Association, to meet the claims arising from the deaths of George M. Reed, at Valentine, Tex.; Edgar F. Phillips, at Detroit, Mich.; Caleb G. L. Pope, at Jamaica Plain, Mass.; Dwight M. Bowers, at Sydney, N. Y.; Duane D. Stilwell, at La Grange, Ind.; Orrin B. Ocker, at Kansas City, Mo.; William H. Jackson, at Brooklyn, N. Y.; Charles T. Beery, at Kansas City, Mo.; Charles C. Boyd, at Roanoke, Va.; Patrick Beggin, at Yonkers, N. Y., and Charles J. Mitchell, at San Francisco, Cal.

Legislation in Texas.—Bills have been introduced in the Texas legislature placing telegraph and telephone companies under the control of the railroad commission, also requiring telegraph and telephone and other public service corporations to operate under State charters and providing that those now in operation can make no further extensions or improvements until they take out State charters.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York. 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

Telegraph and Telephone Handbook for France.—Mr. Ch. Laine, of Paris, France, has issued in English, a neat little volume giving information about telegraph, telephone and postal regulations in France. It was gotten up for English and American travelers to avoid the detentions and annoyances due to the differences in language and unfamiliarity with the French regulations in these matters. It contains telegraph rates, and specific information on arrival and departure of mails, remittances, etc. It also gives very full information and instructions regarding long distance telephone conversations. The price of this book is 75 cents and copies can be obtained of Telegraph and Telephone Age, 253 Broadway, New York.

Martin's Double Lever **VIBROPLEX**, $8.00 f. o. b. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

WANTED.—Live agents in all large Western Union and Postal offices. Central Typewriter Exchange, New York.

Life Insurance is based upon the certainty of death at some time and its possibility at any time. The splendid financial position of the Telegraphers' Mutual Benefit Association, 195 Broadway, New York, is shown in the Reserve Fund, of $317,000, which, apart from current assets, amounts to nearly 6 1-3 % of the total contingent mortuary liabilities, and yields an annual revenue of more than $15,000; operating on sound and correct principles, with ample security, it offers to the telegraph and telephone employe the best and most economical form of protection for the family and dependents yet devised. Write for particulars.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS, Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 8. NEW YORK, APRIL 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY—XVI.

BY WILLIS H. JONES.

Little Things That Count.

If a black sheep is allowed occasional access to a field containing a large flock of pure white animals it may possibly mingle with them a long time before its objectionable presence becomes generally known. It is only after a great number of black sheep appear on the field that the depreciatory influence of each one is noticed. This statement illustrates a condition which exists in every industrial undertaking and discloses what is probably the greatest factor that contributes to inefficiency, viz.: little defects. Big defects are readily detected and quickly remedied. It is the little things which we overlook that count most in the aggregate, and their importance is often belittled.

In the telegraph service the facilities for developing small defects are unusually great, yet a large percentage of them could undoubtedly be avoided if operators could be educated to recognize a sense of personal responsibility to their employers for defects resulting solely from carelessness, indifference, or ignorance on their part. While this may sound harsh the words do not imply a moral or mental inferiority to those following other vocations, but afford the writer an opportunity to call attention to a new but much-needed point of attack in the "uplift" movement now going on in the various official schools inaugurated by the company for the instruction of the operators and employes generally.

In other words the writer suggests that the means of preventing these little defects should be explained and demonstrated so frequently that nothing but willful negligence on the part of an operator could cause trouble.

Let us begin the first lesson with, say, preventable faults caused by operators who use vibratory transmitting devices. This apparatus, if properly handled, would undoubtedly add great capacity to every wire on which it might be used. A few simple suggestions, therefore, offered from time to time would not fail to bring about beneficial results. As the matter now stands the company is rather inclined to discourage further use of this device, and comparatively few operators have any definite idea as to what really contributes towards its present inefficiency.

First, let us suppose that a really good machine sender, with his transmitting apparatus correctly adjusted, relieves a Morse hand sender on a long duplex circuit which has been working smoothly right up to that moment. Now see what happens. In the majority of such cases the moment the machine man begins to send the receiving operator will break and interrupt both sides of the duplex while he explains that the signals are too light. In case the sender cannot remedy the trouble the receiver jumps to the conclusion that the repeater chief at the midstation may be able to "let them down," and after sending for him, more time is lost in waiting. The repeater chief failing to remedy matters, the sender then requests the home quad. chief to pass his signals. This the latter attempts to do by getting the contact points of the polechanger closer together, thus reducing the mechanical inertia of the lever. Still the receiver is possibly not satisfied, and in the meantime enough time has been lost both ways to have permitted the exchange of many messages by hand transmission, and probably ten per cent. more by the machine had the receiver and the sender each known what to do at the start.

Now the light signals complained of were due, in this case, solely to too great a mechanical inertia of one or more parts of the multiplex apparatus, and not to the machine itself. Had each operator been properly posted the receiver would first have lessened the play of the sounder lever. If the home and the repeater station apparatus were properly adjusted, that one operation alone would probably have prevented further delay.

If, on the other hand, the readjustment of the sounder, while helpful, still failed to remedy the

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trouble, the sender should then seek the aid of the home quad attendant and request a readjustment of the polechanger. The repeating station should be called in as a last resort as the fault is least likely to be found at that point.

The lesson to be learned and strongly impressed upon both the operator and the multiplex attendant is that the efficiency of any given circuit will be enhanced and time saved in direct proportion to the degree in which the mechanical inertia of the transmitting and receiving apparatus of the multiplex is diminished.

Hence any failure to maintain this high standard is obviously due, as previously stated, to ignorance on the part of those uninstructed, or to indifference on the part of those who are supposed to understand the conditions, both of which faults are remediable.

Nor does the above information cover all that the machine sender should be told. He should be cautioned about injuring the circuit closer of the Morse key when he inserts his cord wedge. In many cases the thick wedge raises the thin platinum upper contact so high that when the Morse key-lever is reinserted in order to close the key the latter is left open and the fault is not discovered promptly. Hence another source of delay due to carelessness.

The cord also wears out in time and frequently causes temporary openings or high resistance in the circuit owing to broken strands in the conductor, long before the fact is discovered by the unobserving operator. Operators should therefore test all the connections daily, especially when the circuit opens from any cause whatever.

There are also many points in connection with the proper adjustment of the spring contact points that might be explained, such as the relation of spring tension to the duration of the period of contact in the formation of Morse characters.

If the above facts can be brought home to machine users it is obvious that not only will the general efficiency of telegraph service be greatly enhanced but the operators themselves will derive personal satisfaction in the performance of their daily work.

(To be continued.)

Recent Telegraph and Telephone Patents.

ISSUED MARCH 7.

986,306. Cable Telegraph Apparatus. To I. Kitsee, Philadelphia, Pa.

986,405. Transmitting Apparatus for Wireless Telegraphy. To P. O. Pedersen, Copenhagen, Denmark.

ISSUED MARCH 14.

986,606. Telephone Body Support. To V. Tardieu, Arles, France.

986,651. Space Telegraphy. To J. S. Stone, Boston, Mass.

986,787. Telephone System. To A. H. Weiss, Chicago, Ill.

986,806. Reflector for Wireless Telegraphy. To R. d'Antonio, Aquila, Italy.

986,889. Secret Service Telephone Circuits and Switching Mechanism. To A. K. Andriano, San Francisco, Cal.

986,952. Locking Device for Telephones. To W. A. Soles, New York.

ISSUED MARCH 21.

987,107. Telegraph Key. To C. Bolick, Rocky Mount, N. C.

987,128. Telephone Exchange System. To W. A. Fricke, Chicago, Ill.

987,129. Telephony. To W. A. Fricke, Chicago, Ill.

987,304. Telephone. To W. J. C. Kenyon, Chicago, Ill.

987,563. Telephone Attachment. To C. L. Fields, Rochester, Ind.

987,582. Telegraph and Telephone System. To O. D. Lademann, Milwaukee, Wis.

987,630. Quadruplex Telegraphy. To I. Kitsee, Philadelphia, Pa.

987,631. Quadruplex Printing Telegraphy. To I. Kitsee, Philadelphia, Pa.

ISSUED MARCH 28.

987,720. Telegraphy. To B. P. Hayes, Topeka, Kan.

987,864. Operators' Selective Ringing Key or Switch. To W. W. Dean, Chicago, Ill.

987,956. Telegraphic Transmitter. To G. A. Cardwell, New York.

988,044. Telephone Receiver. To H. R. Stuart, Wheeling, W. Va.

The following patents have expired:

516,642 and 516,643. Magneto Telephone. Issued to H. A. Chase, Boston, Mass.

516,777. Telephone Switch. Issued to A. Stromberg and A. Carlson, Chicago, Ill.

516,982. Telephone. Issued to A. C. White, Boston, Mass.

517,243. Single-Line Telephone System. Issued to J. I. Sabin and W. Hampton, San Francisco, Cal.

517,263. Telephone Switch. Issued to F. R. Colvin, New York.

English King and Queen Visit London Telegraph Office.—King George and Queen Mary of England, accompanied by Princess Mary, paid a visit to the new general post office and the Central Telegraph office in London in the evening of March 24 last. Major Walter A. J. O'Meara, engineer-in-chief of the British Postoffice Telegraph, and Mrs. O'Meara received the royal party at the telegraph office. Loyal greetings were received by telegraph from various sections of the kingdom, and from foreign capitals, during the visit.

Mr. M. W. Gothelf, manager of the Postal Telegraph-Cable Company's office at Baton Rouge, La., and winner of the first prize awarded by his employing company for valuable suggestions, writes: "Your excellent journal should be in the hands of everyone engaged in the telegraph business."

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Personal.

Mr. Frank N. Dowler, a well-known old-time telegrapher, has been appointed general eastern agent of the Colorado Midland Railway Company, with headquarters at New York. Mr. Dowler was latterly city freight agent for the Lackawanna Railroad at New York.

Mr. H. P. Trainor, electrical engineer of government telegraphs, Pretoria, South Africa, has arrived at New York from Melbourne, Australia. He will spend a few days in New York and then proceed to London. Mr. Trainor left South Africa January 1 last, on a six months' leave of absence, and is visiting various countries to obtain knowledge regarding the management and operation of the telegraphs and telephones. While in New York his headquarters will be at the office of Telegraph and Telephone Age.

Mr. Frederick F. Fitzpatrick, president of the Railway Steel Spring Company, New York, was a former telegrapher, having first entered the service in 1881 at Kansas City, Mo., for the Western Union Telegraph Company. He afterwards took up railroad telegraph work and was employed successively on the lines of the Atchison, Topeka and Santa Fe Railroad, the Pennsylvania Lines, the Wabash Railroad and the Missouri Pacific Railroad. In 1886 he entered the executive department of the Missouri Pacific Railroad and advanced through various positions. On November 1, 1910, he was elected president of the Railway Steel Spring Company. Mr. Fitzpatrick was born near Peterboro, Ont., June 9, 1866.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. John F. Skirrow, associate electrical engineer of this company, New York, was married on April 8 to Miss Grace Fredericka Kelsey of East Orange, N. J.

Messrs. Harvey D. Reynolds, superintendent, Buffalo, N. Y.; A. L. Edgecomb, superintendent, and C. A. Richardson, acting superintendent, Boston; C. E. Bagley, superintendent, Philadelphia, and H. Scrivens, superintendent, Pittsburg, Pa., were in attendance at a recent New York conference.

Mr. G. H. Usher, general superintendent, Atlanta, Ga., and Mr. Guy E. Paine, general superintendent, and Mr. H. G. McGill, superintendent, Chicago, were recent New York visitors in attendance at a conference.

Mr. D. McNicol, instructor of the Postal Electrical Society, New York, states that the attendance at the meetings is holding up well and the members of the class are making excellent progress in their studies.

Mrs. Irene L. Scofield has been promoted to the managership of the Council Bluffs, Iowa, office, vice Mr. C. M. Sizer, resigned.

Dennis Fletcher, aged fifty years, manager of the Spokane, Wash., office of this company, died on February 14. Mr. Fletcher was born in Brockville, Ont., and entered the telegraph service as operator in his native town in 1873. He held positions in Canada and at various points in the United States, going to Spokane as manager when this company opened its office there in 1889.

Mr. George F. Fuller, manager of the Indianapolis office, whose appointment was noted in the April 1 issue, is a native of that city, being born December 17, 1873. He entered the telegraph service at that place March 17, 1885, as messenger and was advanced successively through the positions of bookkeeper, operator and chief operator, finally becoming manager. Mr. Fuller's entire career has been spent in the city of his birth, and naturally he is thoroughly familiar with its telegraphic needs.

The new offices at Williamsport, Pa., and Syracuse, N. Y., are rapidly approaching completion.

The new Worcester, Mass., office was opened Sunday, April 9.

Magnetic Club Dinner.—The spring dinner of the Magnetic Club, New York, will be held at the St. Denis Hotel, New York, April 26. It is characterized as a "family" dinner, and the editors of electrical papers in New York have been invited to attend as guests of the club.

The major part of the evening will be devoted to social intercourse and entertainment.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of the company, sailed for Europe on the steamer *Celtic* on April 1.

Mr. John C. Willever, secretary of the company, New York, was married on April 1 to Miss Lillian V. Voorhees, at Millburn, N. J.

The desk of Mr. W. H. Baker, vice-president of the American District Telegraph Company of New Jersey, New York, was on April 13 decorated with a beautiful bouquet of roses presented to him by his associates in honor of his birthday.

Mr. William Holmes, superintendent of tariff, New York, has returned to his office after enjoying a brief vacation in Bermuda.

Mr. B. P. Hancock of Jacksonville, Fla., has been transferred to the general superintendent's office at Atlanta, Ga., as traffic inspector to make a study of traffic conditions in the southern division.

Mr. John McRobie has been appointed general manager of the American District Telegraph Company of New Jersey with headquarters at New York, vice Mr. C. F. Patterson, resigned. Mr. McRobie was general superintendent of the company at New York prior to his recent advancement and is highly esteemed by telegraphers in general. His many telegraph friends will be pleased to learn of his promotion, and wish him success in his new duties. He has occupied important telegraph positions in various sections of the country for the past forty years.

Mr. Gardner Irving has been appointed superintendent of the Commercial News Department, New York, and will have supervision of traffic and commercial affairs in New York City, including the operation of the Gold and Stock Telegraph Company.

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Mr. Geo. B. Scott, superintendent of the Gold and Stock Telegraph Company, New York, was retired on pension on April 1, after a service of forty years. Mr. Scott was born in Scotland seventy-one years ago and was reared in Canada. He began his business career as a railroad telegraph operator at Hamilton, Ont. Mr. Scott was one of the foremost in the development of the ticker service and made numerous inventions in that line. He will retire to his farm near Lakewood, N. J.

Mr. J. C. Nelson, general superintendent, Denver, Col., accompanied by division and district officials, recently made a tour of inspection of the Mountain Division.

Miss Genevieve Moore has been appointed manager at High Point, N. C., vice Mr. Clifton Suggs, resigned.

Mr. E. T. Moore has been appointed district commercial agent at Richmond, Va., vice Mr. T. A. Worthington, transferred to the position of manager at Newport News, Va. Mr. Worthington relieves Mr. H. B. Cliborne, who has been transferred to the Richmond operating department.

Mr. Gay Phillips has been appointed manager at Clinton, N. C., vice Mr. H. S. Matthews.

Mr. C. J. Heath, chief clerk for the past six months to Mr. L. K. Whitcomb, division traffic superintendent at Dallas, Tex., has been appointed manager of the Corpus Christi, Tex., office of the company, vice Mr. R. D. Ridgill, resigned.

Mr. S. L. Burts, manager of the Atlanta office, has been appointed commercial superintendent at Jacksonville, Fla., vice Mr. B. P. Hancock, promoted.

Mr. W. J. Francis, manager of the Montgomery, Ala., office has been promoted to the management of the Atlanta office vice Mr. S. L. Burts, promoted.

Mr. D. M. Therrell, division traffic superintendent at Atlanta, Ga., has resigned to return to the Southern Bell Telephone service.

Mr. W. G. Peebles has been appointed chief clerk to district commercial superintendent E. E. Williams at Atlanta, Ga.

Mr. B. F. Ragsdale, general wire chief of the Buffalo, N. Y., office has been appointed chief operator of the Augusta, Ga., office. Mr. C. W. Aldridge succeeds Mr. Ragsdale as general wire chief at Buffalo.

At a recent conference at New York of superintendents of the American District Telegraph Company of New Jersey, the following named out-of-town superintendents were present: Messrs. R. C. Baker, George McGann, M. E. Barrett and F. V. Sackett, Chicago, Ill., and P. G. Kern, Louisville, Ky.

Mr. A. W. Springer, district manager, with headquarters at Wilmington, Del., was recently married to Miss E. L. Cox of that city.

Mr. W. L. Glasheen of the San Francisco office has accepted a position with this company at Los Angeles.

Mr. Harman D. Jones, special agent for the first district of the Pacific Division, Western Union Telegraph Company, San Francisco, Cal., was born in Dansville, N. Y., June 9, 1862. He entered the telegraph service as a messenger for the Western Union Company at Erie, Pa., in 1876, and was in the railroad service from 1877 to 1881. He was employed in the office of the district superintendent of the Western Union Telegraph Company at Cleveland, Ohio, between 1882 and 1906, and then went to San Francisco and entered the office of the district superintendent there. He advanced through the positions of chief clerk, inspector and auditor, finally becoming special agent.

Mr. T. P. McKinney, chief operator at Spokane, Wash., has started a class of understudies in that office and expects that it will meet with favor by those interested. Mr. McKinney will probably adopt Jones' book of diagrams as his text book.

A meeting of superintendents of the Southern Division was held at Atlanta, Ga., March 29, at which the following named district commercial superintendents were present: Mr. J. S. Calvert, Richmond, Va.; Mr. L. J. Maxwell, Jacksonville, Fla.; Mr. E. E. Williams, Atlanta, Ga.; and Mr. J. R. Terhune, Nashville, Tenn. The following named railway telegraph superintendents were also present: Mr. W. F. Williams, Seaboard Air Line, Portsmouth, Va.; Mr. W. P. Cline, Atlantic Coast Line, Wilmington, N. C.; Mr. W. H. Potter, Southern Railway, Washington, D. C.; Mr. J. B. Murphy, Mobile and Ohio, Jackson, Tenn.; Mr. C. W. Bradley (acting) Chesapeake and Ohio, Richmond, Va.; Mr. W. S. Melton, Queen and Crescent, Danville, Ky.; and Mr. W. L. Oakley, Gulf and Ship Island, Hattiesburg, Miss. After the meeting Mr. H. C. Worthen, general superintendent, entertained the visiting officials at a luncheon at the Capital City Club.

Mr. G. W. Hammell has been appointed chief operator of the Nashville, Tenn., office vice Mr. J. F. Fleming, appointed night chief operator.

Mr. W. A. Sawyer, district commercial superintendent, New York, was the guest of honor at a dinner given by managers and other employes of the first district at Troy, N. Y., March 23.

Canadian Notes.

The Great North Western Telegraph Company has increased the pay of a number of its employes, ranging from $5 to $10 per month.

Mr. A. C. McConnell has been appointed secretary and auditor of the Great North Western Telegraph Company, Toronto, Ont. Mr. D. E. Henry has been appointed treasurer and Mr. George Watt superintendent of supplies. All of

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these positions were filled by Mr. George D. Perry at the time of his appointment as general manager of the company.

Investigation of Canadian Telegraphs.

The Canadian Board of Railway Commissioners will commence their general investigation into the operation of telegraph companies at Toronto on April 24, with the object of determining as to whether telegraph tolls charged in Canada are fair and reasonable. The investigation will begin with the Great North Western Telegraph Company as a purely telegraph organization, and this will form a basis for the investigation into the operations of the Canadian Pacific Railway's Telegraph, the Canadian Northern and the Grand Trunk Pacific Railway's Telegraphs where the accounts are almost inextricably interlaced with the operation of the railways themselves, and the Western Union Telegraph Company which only operates directly in New Brunswick, Nova Scotia and British Columbia. The Great North Western Telegraph Company will probably be represented by Mr. George D. Perry, general manager, and some legal light; the Canadian Pacific Railway by its general solicitor, Mr. E. W. Beatty, and an assistant, Mr. James Kent, manager telegraphs, and Mr. W. J. Camp, electrical engineer, the Canadian Northern by Mr. W. C. Muir, superintendent of telegraphs and express, and perhaps Mr. Phippen, legal representative; the Grand Trunk Pacific by Mr. A. B. Sith, general manager, Grand Trunk Pacific Telegraphs. The public will be represented by Messrs. Isaac Pitblado, K. C., of Winnipeg, Man., and W. C. Buell, Barrister, Brockville, Ont., as counsel, and various representatives of Boards of Trade, etc., throughout the Dominion. Messrs. G. D. Perry and W. J. Camp will probably be the principal witnesses for the companies.

The Cable.

Mr. Edward C. Sweeney, superintendent of the French Telegraph Cable Company, New York, has been appointed traffic manager for the company and general manager of the United States and Hayti Telegraph and Cable Company, with headquarters in New York, to succeed the late Louis A. Lurienne.

German-Brazil Cable Opened for Business.—The new German cable from Emden, Germany, to Pernambuco, Brazil, by way of Monrovia, Liberia, which has been frequently referred to in these columns, was formally opened for business April 1.

Jubilee of the Military Telegraph Corps.

To commemorate the fiftieth anniversary of the founding of the Military Telegraph Corps of the United States Army, and particularly the services of forty-one members of the corps who volunteered from or who were residents of Allegheny County, Pa., before the civil war, a superb bronze tablet (size 9 ft. x 4ft. 6 in.) will be unveiled in the Soldiers' and Sailors' Memorial Hall, Pittsburg, Pa., on Friday, April 28, at 4 o'clock p. m.

The names of the forty-one volunteers are inscribed on the tablet, and the faces of twenty-eight are shown in bas-relief around the margin, the centre figure in the upper row being that of the founder of the corps, Mr. Andrew Carnegie, who has promised to be present at the ceremony of unveiling.

The names of the sixteen survivors and the positions they held in the service are as follows: David Homer Bates, cipher operator and manager War Department telegraph office; Joseph W. Boyd, operator; Andrew Carnegie, assistant general manager; Albert Brown Chandler, cipher operator and cashier; Captain Thomas B. A. David, superintendent; Charles William Jaques, operator; Major Joseph Orton Kerbey, operator; Theodore E. Moreland, operator; George Albree Low, operator; Edward W. McKenna, operator; James Hervey Nichols, operator; George W. Perkins, line builder; J. William Pope, line builder; Jesse H. Robinson, operator; John Abernethy Torrence, operator; Robert F. Weitbrec, operator, captured by the enemy and exchanged after being confined in a Confederate prison.

The names of the twenty-five deceased volunteers and the positions they held are as follows: Thomas Armor, operator; Bennett R. Bates, operator; *Nicholas H. Brady, line builder; *Warren Brockett, line builder; Samuel M. Brown, operator; Jesse H. Bunnell, operator; A. Harper Caldwell, cipher operator; *David R. Ecker, line builder; Benjamin W. Flack, operator; *George Holmes, line builder, died in Confederate prison; John Spencer Kerbey, operator; *Henry King, line builder, died in Confederate prison; *Henry Knowland, line builder; *David Morse, line builder, died in Confederate prison; J. Andrew Munson, operator; Martin Murray, line builder; John A. L. McKenna, operator; James P. McIlvaine, operator; John L. O'Neill, operator; *S. Theodore Paisley, operator; *Thomas S. Perkins, line builder, died in Confederate prison; *Augustus Steinmyer, line builder; Thomas Dale Williams, operator; *Ben. F. Woodward, operator; *L. D. McCandless, line builder.

The faces of those indicated by a star do not appear in bas-relief on the tablet, no photographs or pictures of them being available. The faces of all of the others and of the survivors are shown.

It is expected that all of the survivors will be present, and all other members of the corps are cordially invited to attend this unique and historical event.

Relatives of the deceased volunteers, who have not already communicated their names and addresses to the committee in charge of the affair, should do so at once to Mr. David Homer Bates, 6=8 Broadway, New York City, or Mr. Joseph W. Boyd, Soldiers' and Sailors' Memorial Hall, Pittsburg, Pa.

The committee hopes that when the unveiling takes place one or more of the sons, grandsons, or other relatives and near friends of the entire forty-one military telegraphers whose names are indelibly carved upon this enduring memorial, will be present on this historic occasion.

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The Telephone.

Mr. M. J. Carney, assistant to President A. W. Burt of the Wisconsin Telephone Company, Milwaukee, Wis., was a recent New York visitor.

Mr. E. E. Bawsel, division commercial superintendent of the American Telephone and Telegraph Company at Atlanta, Ga., has accepted a position with the Southern Bell Telephone Company at the same point.

Mr. G. Calhoun, division commercial superintendent of the American Telephone and Telegraph Company, New York, has transferred his services to the legal department of the company. The division headquarters have been abolished.

Telephone Assets Sold.—The assets of the Telephone, Telegraph and Cable Company of America, now in bankruptcy, were sold on March 9 for $75,000.

Conducting Business by Telephone.—A Somerville, Mass., man stricken with paralysis, conducted his business by telephone for four months prior to his death while lying in bed.

To Prevent Unauthorized Use of Telephone.—Mr. Charles V. Richey, of Washington, D. C., has invented a telephone attachment which prevents unauthorized outgoing telephone calls during the subscriber's absence. It does not prevent incoming calls from being received, however.

Independent Telephone Companies to Enter Telegraph Field.—The West Virginia Independent Telephone Association at its recent convention, held in Clarksburg, W. Va., passed a resolution empowering the executive committee to take steps toward the formation of a pool of toll lines for the purpose of engaging in the commercial telegraph business.

Darning Stockings by Telephone.—The Pacific Telephone and Telegraph Company of San Francisco received complaints from farmers on a certain telephone line near Madero, Cal., that every Friday and Saturday their line would open and remain in that condition all of these two days. An investigation revealed the fact that a woman was in the habit of taking the telephone receiver off the hook every Friday and kept it off all that day and Saturday to use it as a darning ball in mending the socks of the farm hands.

Meeting of Texas Telephone Managers.—The managers of the Northeast Texas division of the Southwestern Telephone and Telegraph Company met in conference in Dallas, Tex., recently. Many papers pertaining to telephone operation and management were read and discussed. A banquet was held at the conclusion of the meetings, about eighty representatives of the company being present. General commercial superintendent P. K. Baker acted as toastmaster. Among the speakers were Mr. H. J. Pettengill, president, and Mr. J. E. Farnsworth, vice-president and general manager.

Wire Thieves Fire Upon Pursuers.—In an attempt to capture wire thieves near Kearny, N. J., recently, three policemen in the pursuing automobile, and the chauffeur, were shot by the thieves during the chase. The New York Telephone Company has suffered the loss of so much wire in that section lately that it decided to take extraordinary means to capture the thieves. It placed an automobile at the disposal of the authorities for this purpose, and on receiving information that wires were being cut the officers started out after the thieves with the result as noted. The thieves escaped with their booty in a truck.

Organization of Telephone Pioneers.

In our issue of April 1 was printed a list of telephone pioneers who are eligible to membership in the proposed organization of the early telephone men. Since that issue other names have been added to the list as follows: Berliner, Emil, September, 1878; Boeggeman, J. H., May, 1878; Chambers, J. A., June, 1881; Daboll, F. G., March 21, 1879; Gates, C. A., February 7, 1875; Fitzpatrick, Thos. P., 1879; Mellen, A. J., January, 1883; Marshall, H. P., July 27, 1885; MacCrellish, J. A., February 1, 1881; O'Rourke, John, January, 1881; Powell, T. L., February 4, 1884; Raup, K., October, 1880; Thomas, M. F., February, 1879.

Long Distance Telephone in Spain.—Malaga, Spain, is now in long-distance telephone connection with seven cities in that kingdom, including Madrid. The service is to be extended to cover fifty-three important cities within a few months. The rates for conversations of three minutes or fraction thereof, are 9 cents for 30 miles, 22 cents for 125 miles, 40 cents for 250 miles, and 75 cents for 500 miles. In connection with this service a new system has also been inaugurated for the transmission of telegraph messages. A 15-word message destined to any point outside the province of Malaga may be sent for 19 cents; to any point within the province 9 cents. These messages are received on blanks similar to those now in use for the telegraph service.

Test of New Duplex.—On April 4, Mr. George E. Hines of New York gave a practical demonstration of the operation of his new duplex at the School of Ethical Culture in New York. The demonstration was made with apparatus installed in the physics laboratory, the two sets of instruments representing the terminals of a line, being placed on separate benches. The laboratory test was all that could be desired as regards operation. Several representatives of the telegraph and telephone companies witnessed the test.

Mr. F. O. Nourse, commercial superintendent of the Western Union Telegraph Company at Richmond, Va., writes: "It is certainly a great pleasure to me to receive the Age, and I will be glad to continue talking its value."

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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, including Mr. N. W. Harris and Mr. Lewis Cass Ledyard, who succeed Messrs. G. L. Greene and G. W. Perse. The present officers of the company were also reelected.

At the conclusion of the meeting president Theo. N. Vail stated that he considered the outlook for 1911 to be an excellent one and that he expects the business of the company to show about the same percentage increase for 1911 over 1910 as was shown in 1910 over the previous year.

Following is the list of directors and officers:

Directors: Charles W. Amory, Thomas B. Bailey, George F. Baker, Francis Blake, Harry H. Brigham, Alexander Cochrane, T. Jefferson Coolidge, Jr., W. Murray Crane, Henry P. Davison, Rudulph Ellis, Norman W. Harris, Henry L. Higginson, Henry S. Howe, Charles Eustis Hubbard, Lewis Cass Ledyard, John J. Mitchell, William Lowell Putnam, Thomas Sanders, Sylvanus L. Schoonmaker, Eugene V. R. Thayer, Theo. N. Vail, Frank E. Warner, John I. Waterbury, Moses Williams and Robert Winsor.

The officers are: President, Theo. N. Vail; vice-presidents, Edward J. Hall, U. N. Bethell, William R. Driver, N. C. Kingsbury, B. E. Sunny, H. B. Thayer, Charles P. Ware; treasurer, William R. Driver; secretary, C. E. Hubbard; comptroller, Charles G. DuBois; general counsel, George V. Leverett; chief engineer, John J. Carty.

Annual Report of American Telephone and Telegraph Company.

The annual report of the American Telephone and Telegraph Company for the year ending December 31, 1910, has been issued. It forms a pamphlet of 68 pages, and is of unusual interest on account of reference to the complementary operation of the telephone and telegraph services.

The report shows that the gross revenue collected from the public in 1910 for telephone service by the Bell system—not including the connected independent companies—was $165,600,000; an increase of nearly $16,000,000 over last year. Of this operation consumed $54,000,000; taxes $8,000,000; current maintenance $25,700,000; and provision for depreciation $26,200,000. The surplus available for charges, etc., was $51,000,000, of which $11,550,000 was paid in interest, and $25,000,000 was paid in dividends to the public.

The report of the American Telephone and Telegraph Company alone shows net revenue for the year $31,933,214.49, out of which interest amounting to $5,077,321.33, and dividends amounting to $20,776,822.12, were paid. The balance, $6,079,071.04, was an increase over last year notwithstanding the increase in charges due to conversion of bonds into shares. At the end of the year there were about $39,000,000 bonds outstanding which have since been reduced to about $30,000,000.

The interest of the American Telephone and Telegraph Company in its associated operating companies is over 80%, in addition to which it has its own earnings. The American Telephone and Telegraph Company's share of the surplus earnings of the Bell system is approximately 90%, so that the showing of real interest to the security holders of American Telephone and Telegraph Company lies in the figures of the Bell system as a whole.

During the year a great deal of attention has been given to some scheme for pensions and saving which would be of the greatest possible benefit and assistance to the employees, and, if possible, a substantial improvement on any scheme now in force.

The section of the report referring to the relations between the telephone and telegraph systems reveals the plans of the company in the complementary operation of the two services.

The relations between the telephone system and the telegraph system are complementary.

Telephone service annihilates distance in that it brings parties at distant points into speaking distance with each other.

Telegraph service annihilates time in that it instantaneously transmits written messages between different points.

The telephone provides something to be used by the public themselves.

The telegraph performs a distinct service for the public.

A telephone "circuit" consists of two copper wires of superior construction arranged, in a particular relation to each other, forming a metallic circuit equipped with auxiliary apparatus, loading coils, etc., connected with a switchboard—all very complicated and elaborate.

A telegraph "circuit" consists of one wire at most —a grounded circuit. This wire can be divided into several distinct "circuits."

A telephone "circuit" cannot be used for telephone purposes by any but the two parties in communication, during the time of such communication, but the same telephone "circuit" can, at the same time it is being used for telephone service, be divided into two, four or even eight telegraph "circuits," each of which can be used for the transmission of telegraph messages.

The possible use of a telephone circuit is limited by the necessity of the personal presence on the circuit of the parties communicating; by the time necessary to get both parties on the circuit; by the time taken by the communication; and by the intervals lost while waiting for parties.

This limited capacity, together with the costly character of the telephone circuit, makes distance the important controlling element in the cost of telephone toll line or long distance service.

The ratio of the possible number of telegraph messages over the same wires compared to the possible number of telephone communications is very large.

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The use of the telephone for telegraphing messages is limited economically to short distances and the possibility of either being used indiscriminately or interchangeably to very short distances, or to other particular situations.

Any attempt on the part of a telephone company to do a regular "telegraph business" would necessitate a "telegraph" operating organization in addition to its "telephone" operating organization.

Before a telegraph company could do a "telephone business" it would be necessary to reconstruct and rearrange its entire wire plant; to construct and equip central offices, distributing subways and lines, subscribers' connections and stations, at a cost of several times its existing telegraph wire plant, and also to create a distinct "telephone" operating organization.

The large economies are in the joint occupancy and the joint use of the trunk "wire plant." There are in the distributing and branch lines of both services large plant and operating facilities; where to maintain any office there must be utilized the office and employes of some business which has first claim on the service and attention of such employes. Under these conditions satisfactory service is impossible. This waste incident to separate service could be almost entirely eliminated by joint use or occupancy, and by bringing the business entirely under one common control or influence the efficiency and the reputation of the service could be greatly improved.

Cheap service comes from full loads. In the wire service this can only be had by employing the plant to its full capacity, all the time.

In some lines of business like the transportation of passengers, where the unit of service is the car mile, and the overload capacity of the car is large, the average load can be greatly increased by making use of the "overload" during the few hours of maximum business. In no other way could the prevailing cheap fares be afforded for such long hauls.

In the electrical transmission of intelligence there can be no overload. Cheaper service can only be given by the development of new or additional uses which can be distributed over the time now unused.

Up to the present time the telegraph and cable business has been developed wholly on lines of expedition. Theoretically at least there should be no possibility of any further expedition, of any rush or special service, beyond what should now be given.

In the great possibilities of electrical transmission of intelligence some uses will be found or developed to absorb and utilize this enormous waste, by furnishing a service which would be satisfactory to such of the existing business as has heretofore had no alternative, but would prefer the new service.

The Night Letter—the first attempt—met with popular reception and is filling a definite place in the business and social world. The day letter, so recently introduced that its possibilities cannot yet be determined, will doubtless find its place.

It is also intended to extend some of these new classes of service to the transatlantic cables as soon as it is made possible by the completion of negotiations and arrangements now pending.

Until the economies, which may result from the joint occupancy or joint use are determined, there will be no changes made in the present conduct of expedited or regular service. Whether all or only part of the economic waste will be absorbed in the other classes of service is a question yet to be answered; until answered anything that might result adversely either to the quality of the service, the extension and introduction of new services, or to the reasonable profits to which the companies are entitled, would be foolish and uncalled for.

Wireless as a Fire Hazard.

The use of high-voltage transformers for wireless purposes on the ordinary lighting circuits without the proper protective device, says Mr. Elmer J. Lamb in the *Electrical World*, constitutes a fire hazard which has been generally overlooked by wiring inspectors.

The supply mains oscillating in harmony with the antenna of the transmitter carry a static charge, which, although harmless in itself, very often may result in serious consequences. As the supply mains and the oscillating antenna approach the same length they come nearer to a state of perfect harmony—that is, they are electrically in tune—and the trouble becomes proportionally more aggravated.

The charge carried by the "live" side tends to ground itself by jumping to the grounded neutral wire, sometimes carrying the low-voltage current with it and establishing a destructive arc.

In case the fixture is a combination electrolier for the use of both electricity and gas the static current is liable to jump to the gas-pipe ground to relieve the difference in potential, carrying the line current with it and setting fire to the insulation. The fire in turn may be communicated to the insulating joint, which is made of an inflammable compound.

This supposition became a reality in several cases brought under the observation of the writer, the insulating joint taking fire from the resultant arc. Had the fire remained unnoticed for a time sufficient to allow the joint to burn through and let the gas escape what would have eventually happened can be easily imagined.

The trouble is not confined merely to the building in which the transformer may be used, but is strongly in evidence in all places which may be supplied from the same lighting transformer. In many cases, as a result, the voltage coils of the consumers' meters are burned out in identically the same manner as when the lines are affected by lighting disturbances.

This trouble is most conveniently corrected by the use of a small high-tension condenser constructed of glass and tinfoil, arranged in two sections of proper capacity, which must be determined by experiment and is dependent upon local conditions. The condenser should be bridged across the supply mains with a ground connection between the two sections. This arrangement will alleviate any abnormal difference in voltage between the two lines, or between one side and the ground.

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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.]

(33) Q. I have often seen the letters B. T. U. in technical articles. Will you please tell one "who does not know" what they mean? D. N. K.

A. The letters B. T. U. stand for British Thermal Unit. One British Thermal Unit is the quantity of heat required to raise the temperature of one pound of pure water one degree Fahrenheit at or near its maximum density, 39° F.

(34) Q. What is meant (1) by the dielectric strength of an insulating substance, and (2) how is it determined? W. I. M.

A. (1) The dielectric strength of an insulating substance is the maximum potential it will stand without being punctured. (2) It is determined by placing a thin layer of the substance between two metal electrodes and increasing the difference of potential between the electrodes by small steps until a spark passes through the dielectric. The difference of potential in volts preceding that which punctures the insulation is the maximum strength of the dielectric.

(35) Q. Will you please tell me what are the standard elongation and ductility tests for iron telegraph wire? J. F. I.

A. The Western Union standard specifications provide that the wire must be capable of elongating 15 per cent. without breaking, after being galvanized. Tests for ductility are made by placing a piece of wire in two vises, six inches apart, and twisted not less than fifteen times. The number of twists must be distinctly visible on the wire.

(36) Q. Please give me the rule to ascertain the weight of a copper wire when the sectional area in circular mils is given. P. G. M.

A. Multiply the area by the length of the wire and the product by .000003027. This number is the weight of a copper wire one circular mil in diameter and one foot long.

Some Appreciated Postal Testimonials Regarding This Paper.

Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company, New York, writes as follows:

"Thirty-five years ago I began my telegraph career as a messenger boy in St. Louis, and for a very large portion of this period I have been an attentive reader of Telegraph and Telephone Age.

"In sending you the enclosed check, renewing my subscription for another year, I feel prompted to speak in grateful testimony of the value of your publication and of the very high grade and high-toned way in which you have conducted it. You are doing a world of good in educating young men, and even old men, in the profession, and especially are you stimulating them to take interest and pride in their work. I have always found the Age fair and dignified in its treatment of all subjects and all questions and I wish you the full success to which your splendid efforts entitle you."

Mr. Charles C. Adams, vice-president of the Postal Telegraph-Cable Company, New York, under date of March 22, writes as follows:

"Although your publication was most interesting and instructive before it was changed to the Telegraph and Telephone Age, the new issues are editorially broader and more instructive and typographically handsomer. The Age is indispensable to me. Therefore, do not solicit the renewal of my annual subscriptions, but let the renewals be automatic, notifying me when my subscriptions are due."

Mr. E. B. Pillsbury, general superintendent, Postal Telegraph-Cable Company, New York, writes, under date of March 20, as follows: "It is always a real pleasure to receive your paper, which I have read assiduously since the first number. Its appearance always gives me the feeling of meeting an old and valued friend. You have improved its makeup from time to time, until it is now an ideal electrical journal. I regard it as a most helpful and valuable aid to those in our profession who aspire to self-improvement and advancement to the higher grades; and you have my sincere wishes for future success in an enlarged sphere of usefulness."

Mr. Guy E. Paine, general superintendent, Postal Telegraph-Cable Company, Chicago, under date of March 20, writes: "I have for many years looked upon Telegraph and Telephone Age as a valuable Gospel of Self-Help for those who would. I have tried to do missionary work for the paper during all these years, believing that in such effort I was helping my friends in the telegraph business. If any word from me will result in inducing others in our service to become subscribers, I know the Age will retain them as permanent friends."

Bucket Shop Law Declared Unconstitutional.—Justice Wright of the Supreme Court of the District of Columbia, Washington, on March 30, in a decision declared the anti-bucket-shop law unconstitutional. An appeal will be taken. The statute is of local application only and does not necessarily affect the actions which the Department of Justice has begun at many other points against alleged bucket-shop operators, for the prosecution in these cases has been under the postal laws.

Mr. F. S. Lewis, manager of the Western Union Telegraph Company at Jersey City, N. J., in renewing his subscription for another year, writes: "Telegraph and Telephone Age is becoming more and more interesting to me and I would not know how to get along without it."

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The Late L. A. Lurienne.

The death of Louis A. Lurienne, manager in America of the French Telegraph Cable Company, which occurred in Paris on March 25, and which was recorded in our April 1 issue, has taken from the cable world one of its most distinguished and respected personalities. Louis A. Lurienne was born in Normandy, France, in 1859, and studied at the Naval College at Brest, passing his graduation examination among the highest in his class. A weakness of his eyes, however, prevented him from carrying out his intention of following the navy as a profession, and he entered the French government service as a telegraph engineer, constructing several lines in France for it. He was later sent on a similar mission to Siam, at the time France acquired a large tract of land from the Siamese government, and acquitted himself with great credit. He subsequently accompanied his brother-in-law, M. La-Place, on a voyage of scientific research to Terra del Fuego and Patagonia. On his return from this voyage, Mr. Lurienne entered the service of the French Telegraph Cable Company, which company he has represented as manager in America for the past fourteen years in New York City. In this capacity he was devoted to his official duties and was as punctual and constant at his desk as any member of his staff. He achieved great success, and on many important occasions gave proof of executive ability of the highest order.

During the Spanish-American war he was summoned to Washington and informed by the United States Government that he must suspend the completion of the second French cable, which was then about to be landed in the United States, and that the cable must not be landed. He met this situation with a firmness that could not be shaken, informing the government that he would carry out to the letter the instructions of his company, and that the government could cut the cable after it was landed if such a course seemed proper to it. The cable was promptly landed and it is evident that he suffered no disadvantage on account of the independence of his attitude as President McKinley was the first to make use of this new cable by sending a message from the White House to the President of France, congratulating him on the inauguration of this new means of communication between France and the United States. Mr. Lurienne's tenacity of purpose got for his company a considerable indemnity in compensation for the losses it suffered, during the hostilities of the Spanish-American War, in the Antilles Sea, where the company's cables were cut for strategic reasons.

Recognizing his loyal services the French government in July, 1900, granted him the Cross of the Legion of Honor, which recognition was welcomed by his many friends in this country, who, having seen him at work, were able to appreciate his worth as well as his modesty. In the meantime he had succeeded the late Eugene de Bocando as vice-president of the French Chamber of Commerce where he has left the memory of a most courteous colleague endowed with sure and correct judgment.

Mr. Lurienne's health began to fail two years ago, but a vacation in Europe at that time seemed to have benefited him greatly, and he returned to his post in New York with renewed energy. From that time, however, uninterrupted labors and preoccupations of a purely professional nature gradually undermined his strength and the summer of 1910 found him very much in need of a rest and change of scene. Being, however, a man who thought of duty before all else he resisted the urgings of his friends and the advice of his physician and stuck to his duties, feeling that his presence in New York was indispensable. Late in the Fall he was stricken with an illness which drove him to the Catskill Mountains in search of health and later to Europe, but he had delayed too long and this time failed to recuperate, his death occurring in Paris from embolism of the heart.

Mr. Lurienne was a man with many admirable characteristics. He had an extremely dignified presence, which compelled the respect of all who met him. His official acts were always governed by a fine sense of justice and equity and his courtesy and politeness were unfailing. Consecrating all his efforts to the accomplishment of his duty, he avoided the fashionable world and its opportunities for parade, but was at all times accessible by the poor and needy, many of whom benefited by his providence. An enemy of all ostentation his charities were hidden under the veil of anonymity; no one ever made an appeal to his good-heartedness in vain. This beneficence which he always showed to the unfortunate, was one of the predominant traits of his character.

In short, he was a true and generous gentleman whose untimely death has caused genuine sorrow, and whose loss is felt keenly by his many friends, particularly by every member of the staff of the French Cable Company who had worked under his management.

As evidence of the great esteem in which Mr. Lurienne was held by the members of the French Cable Company, a resolution to his memory was passed at a special meeting of the staff members, which was called immediately on the receipt of the news of his unfortunate demise, a copy of which follows:

"*Resolved*, That the New York staff of the French Telegraph Cable Company, wishing to render homage to the memory of Mr. Louis A. Lurienne, their much lamented late manager, forward to the managing director and the adminstration at the company's head office, this expression of their profound sorrow caused by the great loss which has come so suddenly upon them. During the fifteen years that he was with us in New York, Mr. Lurienne had won the respect and affection of every one of us. He was at all times a most courteous gentleman whose every act was guided by a fine sense of justice and equity, and whose personal dignity compelled the respect of all who came in contact with him."

The resolution bore the signatures of the members of the staff.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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April 16, 1911.

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

A Few Observations.

We are frequently asked by operators as to the advisability of giving up railroad telegraph service for commercial service, and vice versa. Questions of this character call for answers that cannot be given without a knowledge of all the attending circumstances, and an answer that might be applicable in one case probably would not fit another. The old saying: "It all depends upon circumstances" is as true and applicable today as it ever was. In general it may be said that if an operator's training and experience have been along commercial lines and he has established a good record for character and service it would be inadvisable, merely to gratify a yearning for a change, to give up a certainty for an uncertainty. Such a man if he desired to enter the railroad service would have to begin at the bottom of the ladder, or near it at least, and when he looked up the ladder he would find many ahead of him. If he were to live long enough he might get to the top or somewhere near it. This same reasoning of course is applicable the other way. A railroad man by reason of his training is not altogether fitted for commercial work and he too, would have to begin in a lower grade position to gain commercial experience. Now, as to the relative advantages of railroad and commercial positions. Perhaps, if one were to choose between the two, all things being equal, the railroad service might be more attractive as offering greater promise for future advancement. The railroads are not hampered to so great an extent by legal enactments as are the commercial telegraph companies and consequently there is greater latitude for energy and enterprise.

From the public's point of view there is vast difference between the telegraph companies and the railroad companies, as far as their relations with the public are concerned, yet as a matter of fact, there is no real difference. They are both common carriers, one of telegrams and the other of passengers and goods. The unreasoning man thinks that when he buys a railroad ticket and gets the transportation it entitles him to he is getting full value for his money; whereas, if he spends twenty-five cents, fifty cents or a dollar for a telegram he does so grudgingly, as if the telegraph company were taking his money without giving a fair equivalent in return. He compares what he calls the "exorbitant tolls of the grasping monopoly" with the post office service which will carry the same communication, and much more intelligence, for two cents, and asks why the telegraph companies cannot do the same. He forgets—he may not know—that in sending a telegram he is really paying for time and speed, and for the use of private property which enables him to save time.

When he pays for his telegram his taxes cease as far as that particular transaction is concerned; whereas for government service his taxes go on without ceasing. He should know the underlying facts and then he would not be so prone to condemn where there is no occasion for condemnation.

The Beginning of the Telegraph.

The late H. M. Dellinger, who fitted up Prof. Morse's first telegraph office in Washington, in 1844, and whose death occurred in that city February 22, recently gave some interesting reminiscences of the early days of the telegraph.

"It was sixty-seven years ago, in 1844," he said, "when the first telegraph office in the world was installed in a couple of rooms in an old government building on Seventh street, Washington. The general post office stood on the site of the old building. The first official dispatches that came over telegraph wire, however, were received in one of the rooms of the Capitol some time before this."

Mr. Dellinger recounted the astonishment with which these dispatches were received at the time. The first was the announcement of the death of an American commodore at Cadiz, in Spain, and the second was the announcement of the nomination of Polk for President. These dispatches were received with incredulity by the scoffers of Morse, and they would not accept them as authoritative until verified

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by mail. Even then there were suspicions of a trick somewhere.

"People had the impression," said Mr. Dellinger, "that it was the paper on which the dispatch was written that was sent over the wire. You have no idea how the people laughed at the old man (Morse) in those days.

"You know Congress voted him $30,000 the year before to build the line between Baltimore and Washington. Well, when that bill was up before Congress he and his telegraph were unmercifully ridiculed. One day he went into the House when the bill was up for discussion and he was very much discouraged and downhearted.

"Nathan Sargent, who was then sergeant-at-arms of the House, came up to him, and tapping him on the shoulder, said:

"'What's the matter, Mr. Morse?'

"'If this bill don't go through I am a ruined man. I can't even pay my board. If it goes through, I am a made man.'

"'Cheer up!' said Sargent. 'It's going through all right,' and it did.

"When Morse took his first messages at the Capitol I don't believe he had an instrument. He held the wires in his hand in some way and brought them against something. That's my impression. They had an instrument in the office, however, which Mr. Alfred Vail operated.

"I remember when Morse brought his lead pipes in coils to Washington the first time. You know, his first idea was to lay wires underground. But that didn't work. He couldn't insulate the wires in the pipes."

Down With the Loan Sharks.

An approximate estimate shows that telegraphers throughout the country are paying $70,000 to $100,000 every year in the form of usury to money lenders. This is a large amount of money to pay to human leeches. It is of course scattered very widely and it is impossible to estimate the individual average. But whatever is the average, it is, in most cases, a grievous burden to the individual.

Debt to loan sharks is an evil that is hard to get rid of when once it has obtained a grip upon its victim, and the man whose income is limited should beware of the traps of these wily individuals, for once he falls into the evil he is on the road to degradation and despair.

If the Western Union Telegraph Company succeeds in stamping out this unnecessary evil—and there is no reason to fear that it cannot—it, together with the Postal Telegraph-Cable Company, which has already banished the loan sharks from its offices and released its employes from this degrading form of slavery, will have benefited its employes to an extent that cannot be measured by the money involved.

Something for Nothing at Last.—A man in New York has invented a machine that fairly imbibes power from the air and runs itself. He claims that he can get from one to 1,000 horsepower from the machine. It requires no fuel or water, only oil. A child, he says, can stop it at will. All you have to do is to start it, then it goes on robbing the air of its power, and when you have had enough power you simply stop the machine. All this is so clear that it is really a wonder that no one has ever stumbled over the idea before. For those who are yet skeptical we will quote the inventor's own technical description. "It is an electric air-power, it takes a dynamo and motor and fan and driving wheel. * * * The flywheel runs the dynamo and the motor runs the fan and the fan runs the driving wheel and the more power you want the less power it takes to run the driving wheel."

Old-Time Telegraphers at Atlantic City.—The Old-Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps will hold their annual reunion at Atlantic City, N. J., September 5, 6 and 7, with headquarters at the Marlborough-Blenheim. There will probably be an unusually large attendance of members and their families. Mr. G. W. Deetz, manager of the Western Union Telegraph office at Atlantic City is a member of the executive committee and has charge of many of the arrangements for the reunion. Col. W. B. Wilson, Holmesburg, Pa., is president of both Associations and Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old-Time Telegraphers and Historical Association. Mr. David Homer Bates, 658 Broadway, New York, is secretary of the Society of the United States Military Telegraph Corps. Any of the gentlemen named will be glad to supply additional information regarding the the coming reunion.

Mr. Thomas A. Edison thought he had discovered an actual case of perpetual motion, in his suit against the Atlantic and Pacific Telegraph Company, Jay Gould, et. al., involving a settlement for his quadruplex patents. The case was before the courts 35 years and was recently thrown out by the Court of Appeals. All of the original litigants are dead, except Mr. Edison, and he for many years was not even interested in the matter.

Delayed Telegram Case.—The Georgia Court of Appeals holds a telegraph company responsible for the loss of a woman's eye through a delayed telegram. It was claimed that if the telegram had not been delayed the physician could have given the case more prompt attention and saved the eye.

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.

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How the Public Benefits by Joint Telegraph and Telephone Service.

Some time ago it was announced that the Western Union Telegraph Company and the American Telephone and Telegraph Company had entered into an operating agreement, says the *Wisconsin Telephone News*, which would result in the co-operation of the two companies for the joint use of facilities, such as pole lines, exchange of wires in cases of emergency, closer relations in having to do with the sending and delivering of telegrams by telephone and, generally, to bring the two great wire using companies closer together for their mutual benefit and for the benefit of the public.

It has been the commonly accepted notion that the telephone and telegraph were competitors. While this is in a sense true, it is a fact, nevertheless, that they perform separate functions, and that their service, in the strictest sense, is not competitive, as it is not possible to do the same things by telephone that it is by telegraph, and vice versa.

For instance, a telegram does not involve both people being at the end of the wire and is a recorded message. A telephone requires that both parties be on the line and no record of the message is made. Therefore, the telephone can be used under conditions where the telegram is absolutely impracticable and, likewise, the telegram can be used when it is out of the question to use the telephone lines. A telegram is delivered, but there is no such service performed in connection with the telephone. It is evident, therefore, that the services are not similar, but they may be used together to the great advantage of the public if both organizations are co-operating for that purpose. For instance, the telephone is the natural messenger at either end of the line; with proper co-operation in the matter of operating methods, assistance each to the other, etc., the message carrying company and the message company completes the arrangement to the maximum advantage of the public so far as the transmission and delivery of the message is concerned.

Because of the size of these two great companies this operating agreement was looked upon with suspicion, perhaps, by the general public, who, feeling that they were naturally competitive, the competition being wiped out might result in advantage to the companies themselves but without advantage to the public.

The companies themselves, however, made this arrangement with only one end in view, and that was the ultimate advantage of the public, and that not a small advantage, but a great one. To be sure, some advantage no doubt was assumed to accrue to the companies themselves, but if there is any such advantage, surely it cannot be begrudged them if great advantages come to the public.

Let us consider the results of this telephone-telegraph arrangement.

Both companies use poles which are serviceable alike to each; both companies use wires which, generally, are serviceable alike to each. The wires of both companies are attached to the poles in practically the same manner. Much territory is reached, or will be reached, by both companies.

Now let us assume that instead of two pole lines serving the purposes of both companies in the territory reached by both, one pole line will largely serve the purposes of both companies, reducing the investment in the pole lines to the extent that duplication is done away with, the investment in pole lines being reduced for both companies, the result, finally will be reduced rates, if rates prove to be too high, considering the saving investment, or in the maintenance of present rates or lower rates than would be possible with the higher investment.

It may occur that the telegraph wires are out of service because of storms, fires, etc., and instead of remaining out of service and delaying the business of the public, the co-operation of the companies bring into use for the telegraph company the wires of the telephone company, or vice versa. Then the public receives, as nearly as possible, a continuous telephone and telegraph service.

All this was intended by both companies when the arrangement was made, and today is effective, and the telegraph wires are coming into play for telephone purposes when telephone wires are out of service, and telephone wires are constantly being turned over for the use of the telegraph company when telegraph wires are in trouble.

All over the country the telephone company, with its many extensions to small points, and with its connections with companies operating in rural neighborhoods, reaches a very large territory not reached by telegraph lines, and that by co-operation between the telephone and telegraph company, telephone users at these points have easier access to telegraph lines and that they can send their message and pay their bills at telephone points without the same being questioned by telegraph offices miles away. This results in bringing the telegraph facilities to thousands of communities which otherwise could not avail themselves of telegraph facilities.

This arrangement actually is effective between the telephone and telegraph company, and the public now is receiving the benefits thereof.

Let us assume that a telephone subscriber desires to send a telegram and does not wish to personally deliver it to the sending telegraph office and has not sufficient time to call a messenger. In the past, if he telephoned his message to the telegraph office, the telegraph company, probably, would not care to extend him credit, first, because it does not know him, and secondly, because of the expense in making the collection for the messages, which, in a majority of instances, would nearly equal the charge for the telegram. It was necessary, therefore, for him to deliver the message personally to the telegraph office or call a messenger.

The present arrangement between the telephone and telegraph company contemplates that any telephone subscriber shall have credit with the telegraph company until he has proven that he is unworthy thereof. He may, therefore, step to his telephone, and because of the co-operation between the two

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companies, simply say, "Telegram" to the telephone operator, and be connected with the telegraph office, which takes his message, transmits it prepaid to any part of the world and charges the cost of the message against him as a telephone subscriber, the charge being collected by the telephone company without inconvenience to the subscriber. This, certainly, is a great benefit to the public, and makes every subscriber's telephone a telegraph station as well.

A traveler may determine that he wishes to send a telegram, perhaps while he is walking on the street. In the past it has been necessary for him to seek a telegraph office to place his telegram. With the co-operation of the telephone and telegraph company he may now step into any public telephone pay station, and if the same has an automatic coin collector, can call the telegraph company, place his telegram, and collection for the same will be made by the telephone operator in the same manner as she would collect for a telephone message.

A traveler may determine that he will place a telephone call for some distant point. He does so with the attendant at some public telephone station. He learns that his party is out, and then determines that he will use the telegraph. In the past it was necessary that he seek a telegraph office, which might have been many blocks away. Under the new arrangement between the telephone and telegraph company he may now place his telegraph message with the telephone operator, who will either permit him to write it on a blank and leave it with her to be taken care of by herself, as a joint employe of the telephone and telegraph company, or he may telephone the message to the telegraph office himself and pay the telegraph charge therefor to the telephone operator.

There are hundreds of points throughout the country that are reached by telephone and telegraph lines, and while the nature of the business makes it necessary that the telephone office remain open twenty-four hours in the day, the telegraph service at night is so light that the telegraph company cannot afford to keep its office open. This leaves all of such communities without telegraph service at night, either for incoming or outgoing telegrams. Telegraph charges to long-haul points are ordinarily lower than telephone charges. The night message is one ordinarily of great importance, and circumstances are oftentimes such that it is impossible to telephone as the two parties cannot be gotten together on the line. The telegraph service, therefore, is especially valuable to these communities at night.

In the past it was possible for people in these communities to have placed their calls for the telegraph office to the nearest open telegraph office in some other city, if they knew where that office was and were certain that the telegraph company at that point would accept their message and bill them for it, a thing rather unusual and impracticable except in the case of the very occasional party who might be well known by the telegraph company; but if such calling party were successful in placing their telegram, they would have been obliged to pay the telephone charge from their city to the city in which the open telegraph office was located and the telegraph charge from that point on. This meant an increase in the telegraph charge by the amount of the telephone message, and this charge, together with the difficulties in working out the arrangement, made telegraphing from all such points impracticable, if not impossible.

The present arrangement between the telephone company and the telegraph company means that all such points where there are both telegraph and telephone offices one may, at any time, day or night, when the telegraph office is closed say only "Telegram" to the telephone operator and be connected immediately with the nearest telegraph office wherever that may be, place his telegram, have the same charged to his telephone station, and the rate paid by him is only the regular telegraph rate from the point at which he telephones—no charge being made him for the telephone message, that charge being paid to the telephone company out of the telegraph rate. This means, at all such points, an actual reduction in cost to parties sending telegrams at hours when the telegraph office is closed.

For instance, at New London, Wis., the telegraph office is closed at night. The regular night telegraph office for that district is Oshkosh. The telephone rate from New London to Oshkosh is twenty cents, and the telegraph rate from Oshkosh to New York is sixty cents. In the past if a party desired to telegraph during the time that the telegraph office was closed at New London he would have been obliged to call Oshkosh and pay twenty cents for his telephone message to that point, and his message would have been sent from Oshkosh to New York at a charge of sixty cents, paying a total of eighty cents to get the telegram transmitted.

Under the new arrangement, he pays only the regular telegraph rate from New London to New York, which is sixty cents. His cost, therefore, is reduced twenty cents.

The public, under the new arrangement, may feel that at all times, day or night, it is in touch with a telegraph office and need not worry where it may be. A patron has only to say "Telegram" to the telephone operator and she does the rest. The patron need not consider the cost of the telephone message in connection with the transaction, as the patron pays only the regular telegraph rate; the same rate he would be obliged to pay if he went to the telegraph office in his own city and filed the message there.

In this day and time, when innovations and inventions are developed and commercialized before one knows what is being done, it is easy for us to accept as the ordinary the most wonderful and extraordinary advantages. It may be, therefore, that this great service now provided by the co-operation of the American Telephone and Telegraph Company and the Western Union Telegraph Company will be accepted as such, but when one considers that by the means of these two great services they are given the fullest measure of advantage of

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both by using either one, and this with a reduction rather than an added cost, it would seem that the man at the head of these two great enterprises. Mr. Theo. N. Vail, should be counted as one of the few great men of the times, and a master in the development and operation of a public utility business, and that the whole transaction should serve as a lesson that, contrary to the commonly accepted belief, combinations of this sort can be made to the great advantage of the public, and that the same should be encouraged and, especially, that this arrangement should receive the applause and commendation of all individuals and bodies politic.

If there is the slightest suspicion that any advantage to be gained might be made to satisfy only the selfish aims of the two concerns, this should be put at rest by the results already attained; but if still there should be those who fear the future results, they certainly cannot question the possibility for advantage to the public, and with the great national regulating body, in the shape of the Interstate Commerce Commission, now watching over the public interests, they may be certain of their rights being protected. With that knowledge the public should applaud the enterprise of these two great concerns which, without force or compulsion, and of their own free will, did away with the barrier separating the two and have not only given the public the benefits thereof, but by reason of the combination have practically forced these benefits upon the people.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER LI.

What is the effect of wet weather on telegraph lines?

What is the cause of these effects?

Why do relays distant from the source of current supply receive less than normal current?

What is the first principle to be observed in adjusting the relay?

How should the adjusting be done?

Why should the relay spring not be stretched to excess?

How should the strong magnetic pull of the magnets be taken care of by the armature and spring?

In wet weather why is it difficult and sometimes impossible to break the operator at or near the battery station?

How can the operator at the home station or a nearby station avoid this difficulty?

What should be done to make a sounder produce a louder noise?

Is it advisable to give the sounder lever wider play in order to get more sound out of the instrument?

What is the effect on the signals of giving the lever wider play? Describe the action of the lever under such circumstances.

What rule should be observed in adjusting the lever for different speeds of operation?

What is the method for adjusting for maximum strength?

When signals "drop out" what is the usual cause of the defect?

If a loose connection is the suspected cause, what is the proper procedure to locate the trouble?

How is the local circuit tested for trouble of this character?

Name other causes of trouble of this kind.

When a sounder stands "open" by what means can it be ascertained if the trouble is in any of the relay connections?

Under what conditions should the "knife blade" test not be made?

Why is it not possible to send at high speed on a line containing many offices, especially if they are close together?

Where speed is required how should the sounder lever be adjusted?

Why is it important to exercise great care in the adjustment of multiplex apparatus?

If sending is heavy or light at a repeater is it possible for the receiving operator to compensate the defect?

Finding a Man by Telephone.

A remarkable story of the use of the telephone to locate a man whose whereabouts were unknown was related by Mr. George K. Gann, of Lincoln, Neb., at a recent telephone convention in Chicago. A woman called up the Lincoln exchange one day in great excitement, and after some difficulty it was found that she was the wife of a traveling man who had left home a day or two before on one of his trips. The wife had just discovered that a bottle of laudanum was missing from the medicine closet, and as her husband was taking cough medicine from a bottle of similar shape, which had been left behind, she was greatly alarmed realizing that her husband had taken the poison with him by mistake. She rushed to the telephone at once to call up her husband in some way and tell him of his mistake, but she was unable to tell the operator where her husband might be located; she did not even know what state he might be in. The telephone company called up the employer and obtained a list of about twenty towns in one of which it might be possible to locate the man wanted. These places were called up in succession, and after three or four attempts the traveling man was located. In a few minutes a happy though excited woman was talking to a surprised husband. After the latter had succeeded in convincing the anxious wife that he was really alive he told her that he had noticed his mistake shortly after he left home.

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A New Primary Battery.

Messrs. T. Pichinot and L. Fischer, of Reinbek, near Hamburg, Germany, have recently placed on the market a new primary cell which seems to possess some distinct advantages over most of the older types, says *Zeitschrift für Elektrotechnik und Maschinenbau.* The negative plate is of zinc, and the positive is composed of some lignitic material, which is apparently pressed when in a plastic state into rectangularly formed plates. Each cell contains several separate lignite plates and two large zinc plates. The electrolyte is not specified.

It is claimed that the internal resistance of the cell is very small, and, moreover, that the resistance does not appreciably increase even after long periods of work. The salts which are formed by the action of the electrolyte are not deposited on the plates, but are dissolved by the electrolyte itself. The e. m. f. of the cell is about 1.4 volts, and this voltage is maintained until the cell is completely exhausted. The zinc consumption is said to be extremely small. Another good point is that there are no soldered connections, so that one fruitful source of trouble is thus avoided. The cells are made up in batteries suitable for lighting small rooms. These batteries give a pressure of 10 volts, and have a capacity of 160 ampere-hours. The cell is called the Niewarda-Element.

Life of Primary Batteries.

In a paper read by Mr J. G. Lucas at a meeting of the Institution of Postoffice Engineers, London, the author gave the results of some investigations carried out in connection with the ordinary types of signaling batteries used by the British Post Office and other telephone administrations. Referring first to the porous-pot Leclanché type of cell, text-books were, the author stated, very much out of date on this question and pointed out that modern telephone requirements could be met much more economically by modifying the sub-division of the manganese dioxide and carbon in the porous pots. In the case of even such small current discharge rates as forty milliamperes the result of the modifications was to decrease the total working costs considerably, while at discharge rates higher than forty milliamperes the decrease in costs was much greater. The agglomerate form of Leclanché battery was an expensive type, and the possible advantages which might be derived from its use were not, he considered, commensurate with this expense.

Investigations with dry cells as at present designed went to show that the chief difficulties and expense lay in the fact that for discharges which must necessarily be spread over several months full use could not be made of the chemical energy contained in the materials used in these cells owing to the sudden rise, after a time, in the internal resistance. The behavior of experimental cells indicated that the difficulties were not insuperable.

The free ammonia gas evolved from Leclanché cells has been found to seriously affect the metal work of telephones and to act deleteriously upon secondary cells. To overcome this objection experiments had been conducted with an electrolyte of manganese chloride instead of the usual ammonium-chloride solution with satisfactory results. The author pointed out the practicability of sealing up the battery compartments in connection with cells charged with manganese-chloride solutions and the consequent reduction in loss by evaporation as compared with ammonium chloride.

Telegraph, Telephone and Cable Directory.

If you wish a complete and accurate directory of the telegraphs, the Bell telephones, the wireless telegraphs, the names and addresses of all the superintendents of telegraph of all the railroads in this country, the names of the superintendents of fire alarm and police telegraphs, send us twenty-five cents and receive a copy of our January 1 directory number of Telegraph and Telephone Age. This is a ninety-two page paper containing interesting information including the names and addresses of the managers of several hundred Western Union and Postal Telegraph-Cable Company offices in the principal cities in the United States and all of the officials and managers of the Great North Western Telegraph Company and the Canadian Pacific Railway Company's Telegraphs in Canada. This issue also contains full page engravings of the new president and the retiring president of the Western Union Telegraph Company, Mr. Theo. N. Vail and Colonel Robert C. Clowry, respectively.

Another feature of practical importance in this issue is the article giving the standard electrical notation and the definitions of electrical terms now in general use.

The Morse and continental alphabets used by the telegraph, cable and wireless companies throughout the world are also shown. Full statistics and names of officers and offices of the Signal Corps of the United States Army in Alaska and elsewhere are also given.

In addition to all of this valuable and interesting matter is an index of the contents of the twenty-four issues of Telegraph and Telephone Age for 1910.

The price of this issue, twenty-five cents, does not begin to represent the true value of this paper. Many firms who obtained one copy have purchased several additional copies for the use of the heads of various departments and their traveling salesman. Send 25 cents in one or two-cent stamps to J. B. Taltavall, publisher, 253 Broadway, New York.

Mr. A. C. Cronkhite, district commercial superintendent of the Western Union Telegraph Company, Indianapolis, Ind., writes: "I wish to thank you for the renewal in advance of my subscription, as I would dislike very much to miss a single issue of your valuable paper."

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How Wireless Messages Are Sent from Vessels in Distress at Sea.

The question, "What is the character of wireless messages sent out from vessels in distress at sea, and how are they handled?" is one that naturally comes to mind in connection with events of this nature.

A contemporary publishes the wireless-distress call sent out from the steamer *Queen*, which was discovered to be on fire while on her way from San Francisco to Seattle, Wash., last January, and the resulting correspondence with other vessels. Mr. Arch Macdonald, the wireless operator recorded the calls and messages as follows:

"SOS. SOS. SOS. On fire ten miles north of Point Reyes." Signed "Queen" (GX)."

The government station at Mare Island (NPH) answered and asked her position again.

"SOS. SOS. SOS. Send us some help. We are afire in forward hold. GX."

Six stations answered this call. GX answered, "Don't all answer at once. I won't be able to read anybody. GX."

Hillcrest, the 15 k. w. station at San Francisco (PH), answered "Have 'phoned your message to Malorin (chief operator of United Wireless Company)."

"Is any ship near us? GX."

PH called the steamer President (GW), and said, "Queen afire. Go to her help! PH."

"Get orders and we'll proceed. GW."

GX then gave GW her position and said, "Hurry for all you are worth. Fire gaining. GX."

At 6.25 p. m. GW asked, "Is it blowing much?"

"A small-size gale is blowing. GX."

"Are the passengers in danger? PH."

"No. We have them all out in library and social hall. GX."

At this time the operator on the steamer Norwood (SG) came on duty and asked "What is the trouble?"

"Do you know we are afire? GX."

"Tell your captain quickly, we are afire ten miles north of Point Reyes. GX."

GW now called the steamer City of Pueblo (GQ), and said, "Keep sharp lookout for the Queen. She's afire above Point Reyes. GW."

"Will come to your aid right away. SG."

"How badly are you off? SG."

"Don't know. But bad enough. GX."

"Will we have to take passengers off? SG."

"No. The President will be here at eight o'clock, but you can help us, I guess. GX."

"Am leaving to assist," said the revenue cutter "McCullough" (RCH).

"Wire full particulars as to what is being done. Is fire under control? PH."

"The fire started in the forward hold among the oil cans. We are getting it under control. GX."

All this time GW had been fighting the gale up the coast, and was near the point given out by GX.

"We are nearly there. Can you see us? GW."

"Wait a minute. I will go outside on deck and look. GX." He then went outside his cabin and looked for the President.

"No, cannot see you yet. GX."

"O. K. Have you got it out yet? Are you under way? GW."

"No. GX."

"GW. Have you sighted GX yet? NPH."

"Not the last time I was on deck. GW."

Ten minutes later. "We are right close onto you now. Am here when you want anything. GW."

"O. K., GW. Wait a moment. GX."

Ten minutes later. "What's the matter? PH."

"Nothing new, about the same. GX."

RCH now called GX. "We are off Point Bonita bound for you, full speed. Please give us your latitude and longitude. Will be up to you in an hour. RCH."

"On my suggestion, could you go to San Francisco? I will follow slowly if conditions are such that we can do so. Have information by wireless that southeast gale is approaching," said Captain Thomas of the President.

At 10:30 p. m. GX said, "Tell Captain Thomas we have fire under control and are going to turn around for San Francisco. GX."

The operator on the *Queen* assured himself that all would be safe. "Will you follow us closely? GX."

"Yes, we will. GW."

"We are trying to make San Francisco now. GX."

"Can we be of any more help? SG."

"Have fire under control now. Many thanks. GX."

In about five minutes came the message, "We are now under way with fire under control. Good-by. GX."

Destruction of Poles by Woodpeckers.

Mr. W. H. Meyer, manager of the Sault Ste. Marie, Mich., office of the Western Union Telegraph Company, writes as follows:

"I have read with considerable interest the articles published recently in your journal in regard to woodpeckers destroying telegraph poles. Several years ago I experienced considerable annoyance from the feathery tribe in picking cherries from cherry trees. I tried the following remedy with success, and I believe it may also be used to frighten away the woodpecker. Into a good size cork were imbedded pieces of a broken mirror and this was hung in the trees, a few feathers being added to give the cork air resistance. The feathers kept the cork in motion and the sun flashes cast back by the pieces of mirror evidently had a disheartening effect on the birds. The device was a decided success as far as its application to cherry trees was concerned, and it certainly had the advantage of being inexpensive."

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An Old Telegram.

The accompanying illustration is a reproduction of a telegram received at the Cincinnati office of the Pittsburg, Cincinnati and Louisville Telegraph Company, November 28, 1848. The original message, from which the cut was made is in an excellent state of preservation, the ink being as fresh-looking as when it was first applied. The blank measures 4⅞ inches wide and 7½

Pittsburgh, Cincinnati and Louisville Telegraph.

CINCINNATI OFFICE—COLLEGE HALL—THIRD STORY.

All Communications strictly confidential.

☞ To make the Telegraph efficient, the public must be the conservators of its own interests, and should make known every cause of reasonable complaint at once to the Manager, Trustees, or Superintendent. All such will be investigated promptly.

Business men, whose offices close early, and all who have anything to do with the Telegraph, are earnestly requested to leave full addresses of residence and occupation, so that the delivery of despatches can be secured with certainty and without delay.

All messages must be pre-paid, save where answers have been arranged, to be paid for on delivery, and of which previous notice should be given.

The following communication, dated Philadelphia
was received at this office at 9 o'clock 5 minutes A M,
Nov 28 1848

Mr Wm Kite

Send word when you will start. we daily look anxiously

Edith Kite

REPRODUCTION OF AN OLD TELEGRAM.

inches high. This ancient message is interesting in the light of present-day practice, and exhibits some details in form that have been eliminated in modern blanks. The message was loaned to us by Mr. Kite through Mr. R. C. Bliss, manager of the Western Union Telegraph Company at Cincinnati.

The Working Boss.

BY E. C. DODGE, CHICAGO, ILL.

It is possible, with the addition of the proper resistance, to ring a door bell as satisfactorily with a current of five thousand volts as with two volt current, but the installation of a five-thousand volt plant for that purpose would seem the height of folly, yet there are five thousand dollar men doing two dollar work every day.

It is amazing to note the number of high-salaried men who lose sight of the fact that they are cheating their employer by doing a lot of detail work which properly belongs to a fifteen-dollar-a-week clerk. The five-thousand-dollar man who earns his salary is the man who can put his hands in his pocket and, by walking around among his men, with his eyes open and with a clear head, pick up an idea here and there which will save or earn his employer twice his salary every month in the year. It is keeping close to the actual work and observing the methods and talking to the men who are doing the actual work, which makes the money. Even the janitor can often give a pointer which is of value. Many a workman is pegging away in some corner following along an old rut and all the time nursing an idea which would save dollars if he could only get in touch with the powers that be; but his suggestion to the next one above him in authority is generally as far as it gets and he soon settles down with the conclusion, "What's the use?"

The "big fellow" who has his department properly organized has always time to listen and ask questions. It is not necessary for him to interfere in any way with workmen or issue any orders outside of the regular channel, but by divesting himself of all detail work which can be thrown upon the shoulders of his assistants, he is in a better position to observe and plan schemes and methods which will make him of more value to his employer. These are the kind of men big corporations and progressive business firms are looking for and they are ready and willing to pay the price, but they are scarce and hard to find.

Cyclopedia of Telephony and Telegraphy.

The American School of Correspondence, Chicago, has issued a cyclopedia of telephony and telegraphy which covers these branches of the electrical arts in a very complete manner. There are four volumes in the set, and the subjects are treated and presented in such a simple manner that no one can fail to readily absorb the information.

The telephone section of the work covers the installation, maintenance and operation of all types of telephone systems, discusses without prejudice the respective merits of manual and automatic exchanges, and gives special attention to the various "troubles" that are met in actual practice.

The sections relating to telegraphy cover both commercial service and train dispatching; and they include a full treatment of the practical methods of wireless telegraphy. There are chapters on testing and testing instruments, management of storage batteries, telegraph apparatus, repeaters, multiplex telegraphy, wireless telegraphy and wireless telephony.

The use of the telephone in railway service is also thoroughly covered; in fact the work is right up to date in telegraphy and telephony, and covers the latest practice.

The March bulletin of this school gives much information regarding this institution and its work. It includes outlines of the various courses, also synopses of text books used in connection with the studies. The school has a long list of text book writers and instructors, all of them experts in their several lines.

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Two Wires on One Lamp.

BY J. B. DILLON, OF DALLAS, TEX.

There has been so much criticism relative to connecting two wires to one lamp at the main switchboard that the writer made some tests with long circuits to determine the soundness of the practice. It is good practice to place two wires on one lamp when they are practically alike as to resistance, etc., and it has been checked by watching the results as indicated on a mil-ammeter.

Fig. 1 shows the usual method of connecting two circuits to one lamp at the switchboard. Line 1 is, say, 200 miles long, of iron wire, with a resistance of 2,800 ohms. It includes 30 relays each with 150 ohms resistance, making the total resistance of the circuit 7,300 ohms. This line with a pressure of 180 volts at each end is represented in Fig. 2. To the main line add the resistance of the two lamps (720 ohms) and we

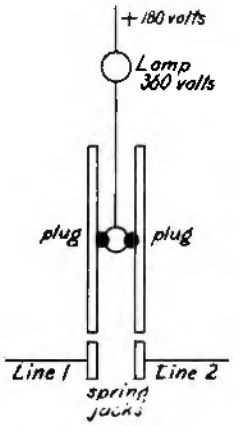


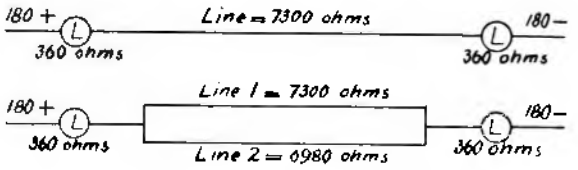
FIG. 1.—METHOD OF CONNECTING TWO LINES TO ONE LAMP AT THE SWITCHBOARD.

have a grand total of 8,020 ohms. With an e. m. f. of 360 volts the current in the circuit is 44.8 milliamperes.

Line 2 is also of iron, 220 miles long, the total resistance of line, relays and lamps being 7,700 ohms. With the same e. m. f. as before, 360 volts, the current is 46.7 milliamperes.

Fig. 3 shows these two circuits connected to the same lamp. In this case the joint resistance of the two lines must be taken into consideration. This is found to be 3,568 ohms, which, with the resistance of the two lamps added, makes a total of 4,288 ohms. With an e. m. f. of 360 volts as before circuit 1 in Fig. 3 gets a current of 41 milli-amperes as against 44.8 milli-amperes in Fig. 2, while circuit 2 gets 43 milli-amperes as against 46.7 milli-amperes with only one circuit per lamp.

It is evident therefore that by using proper potentials two wires on one lamp is not so inadvisable as many believe it to be. As an example of the ill-effect of not exercising care in the assignment of proper potentials, let us assume a case where circuit X has a resistance of 4,800 ohms and circuit Y 2,400 ohms. Using an e. m. f. of 180 volts at each end, and lamp resistances of 360 ohms, as before, X alone will receive 65 milliamperes and Y alone 115. With both circuits worked jointly with one lamp, X will receive 51 milli-amperes and Y 102, omitting decimals. This circuit, it is needless to say, would not work satisfactorily. The conditions were assumed simply to demonstrate the importance of combining circuits of practically the same resistance, and exercising discretion in placing potentials, it being



FIGS. 2 AND 3.—SINGLE AND TWO LINES CONNECTED TO ONE LANMP.

evident that 90 volts would have been more practical in the present instance in case a smaller potential was not available. The writer believes that the switchboard should be wired so that there will be two lamps for each potential, thereby avoiding the snares and pitfalls for the improper placing of two dissimilar wires on one lamp.

Conference on Electrical Rules Disbanded.—The National Conference on Standard Electrical Rules was formally disbanded at a meeting held in New York on March 24. This body comprised delegates from various national organizations, including the American Institute of Electrical Engineers, International Association of Municipal Electricians, National Electric Light Association, National Electrical Inspectors' Association, and Underwriters' National Electric Association. The last named organization having been consolidated into the National Fire Protection Association so as to bring the work of fire-preventing engineering under one head, and an electrical committee having been established as a part of a working association of national standing which can provide machinery for carrying out its work, the need for the national conference no longer exists. The holding of general meetings of the electrical committee every two years, to which meetings all will be invited to participate in suggestions and discussions, is to be continued as in the past by the National Fire Protection Association.

Mr. B. S. Jenkins, general superintendent Canadian Pacific Railway Company's Telegraph, Winnipeg, Man., in sending in four new subscriptions, writes: "The Age is keeping well abreast of the times in giving prompt information as to developments in the telegraph and telephone fields, and every telegrapher who desires to be up in his profession should be a subscriber."

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Reminiscences of an Old-Timer.

Major J. Orton Kerbey, of Washington, D. C., the well known old-time and military telegrapher, and ex-consul to Para, Brazil, in a letter referring to the unveiling of a bronze tablet this month in the Soldiers and Sailors Memorial Building, at Pittsburg, Pa., to commemorate the fiftieth anniversary of the founding of the Military Telegraph Corps, states that he reads Telegraph and Telephone Age with much interest, especially the articles from the military telegraph boys. "I confess," he says, "to being an old-timer who retains pleasant impressions of early days and perhaps entertains a prejudice against the modern doings on the wires." Continuing, Mr. Kerbey says: "I got out of the work about the time that the duplex and quadruplex were being adopted and entertained the opinion then that they would certainly be failures, as I was positive that it was utterly impossible for two currents to pass on the same wire, and in all these years I have never been fully convinced that they really do. I fail to become absorbed in the study of the diagrams printed in the Age, which I think are apt to drive a man a bit daft. Neither do I comprehend the puzzles in geometry and algebra wherein is placed a big O with a -- or an X, etc.

"I adhere to the good old magnet with its abundant coil of fine copper wire covered with green thread which magically vibrated the armature and which we 'adjusted' for escape or grounds by a rubber spring. Those were the good old days when we tried the duplex on a single wire by fighting the fellow at the other end for circuit. Perhaps it was that species of contest that developed the duplex. I know of fine operators who could pound the key with their fists for an indefinite length of time.

"Those were halcyon days in Mr. Carnegie's office when the boys, David Homer Bates, Sam Brown, Bennie Flack and Dode Moreland, had to take turns cleaning the battery which was of the old Grove pattern of zinc and porous cup and potash. There was not only danger from the burning acid but as the cups were not well insulated, one working near the battery was liable to get severe shocks that would cause him to spill the acid and get stains on his clothing and body. All the boys had stains on their fingers of a yellowish tint, which was an advantage in one respect.

"In those days to be an 'operator' was a coveted distinction. The boy with stained fingers and spotted clothes was looked upon as something to be envied. He had free admission to the theatres and circus and other places where the ordinary boy did not have access to. It was only necessary to show his stained hands to identify him as a 'telegraft operator.'

Another means of proving an operator's identity was the copper wire shoe strings. I ought to know about these things as I was one of the earlier cubs at the famous '2' office when Andrew Carnegie was division operator and secretary to Col. Thomas A. Scott, superintendent of the Pittsburg Division of the Pennsylvania Railroad, and had to do my stunt cleaning zincs with a brush. When Col. Scott was advanced to be general superintendent and moved to Altoona, I was made division operator to succeed Mr. Carnegie, when only 17 years of age. I was tempted to join the Western Union force of three men in the Pittsburg office by an offer of an advance in salary, which I declined.

"The year preceding the war was spent in the South, principally in Texas, but I was obliged to leave on acount of some boyish talk in favor of the North. On my return I went to Washington and from this date the story of my experiences as an operator in the war is told in the book, 'The Boy Spy.'

"The fiftieth anniversary of the founding of the Military Telegraph Corps to be marked by the unveiling of a bronze tablet in the Soldiers and Sailors Memorial Hall at Pittsburg, will be an interesting event for all concerned. Though I had planned to sail for Brazil and the Amazon in April I have postponed the date of sailing until May, in order that I may attend the unveiling.

"You know of my consistent telegraph record in subsequent years as an operator at Pittsburg and in the oil regions, becoming manager and superintendent of the Atlantic and Pacific Telegraph Company in my home town, Pittsburg. I performed some work for the press service during the riots that resulted in my transfer to Washington where I worked a special code wire at night to Chicago. During the day I was Associated Press operator in the Senate gallery. I was then appointed U. S. Consul to Para by Secretary James G. Blaine, because I was a telegrapher whom he thought would be able to investigate the rubber industry, rubber being necessary for insulation in this electric age. Secretary Blaine was a far-seeing statesman, but not even he could foresee the wonderful development of the rubber interests for bicycle and automobile tires.

"I have been 'rubbering' ever since, having succeeded in publishing two books, 'Land of To-morrow' and 'An American Consul in Amazonia,' dealing with cable and wireless in the Andes and detailing social life in the land of eternal sunshine and occasional hurricanes. The latter book is now on the press."

New Telegraph Company Incorporated.—The Metropolitan Telegraph Company has been incorporated at Wilmington, Del., with a capital stock of $100.000. The incorporators are Messrs. W. J. Maloney, M. C. Taylor and W. N. Akers.

Mr. George M. Myers, one of the foremost citizens of Kansas City, Mo., an old time telegrapher and president of the Mutual Pacific Telegraph Company, which sold out to the Postal Telegraph-Cable Company many years ago, in renewing his subscription has this to say: "It is always a great pleasure for me to forward my annual subscription to you. I read the Age with more interest than I do any other journal I receive."

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Multiplex Telegraphy.

BY S. R. BEATTY, NEW YORK.

If we picture a multiplex telegraph circuit as a condenser into which a current flows until it is charged, the flow of current being maximum at the instant the e. m. f. is applied, the condenser acts as though it had acquired a counter e. m. f. which is the equal to and the opposite of the impressed e. m. f., this counter e. m. f. being at maximum when the impressed e. m. f. is at zero, or when the pole-changer is midway between the two power terminals. The discharge of the condenser (or the main and artificial lines) occurs at this instant through the spark condenser, thereby partially eliminating the spark The condenser has no effect whatever upon the electstatic capacity of the line, as it still requires the same value of electricity to raise its potential to unity. To go more into detail would make this article very lengthy. The foregoing, however, should make the action of the spark condenser quite clear.

A few words upon the electrostatic capacity of the line might not be amiss. The ideal telegraph circuit is one which charges and discharges very rapidly, this action depending upon the condenser action of the circuit, or the electrostatic capacity of the line which is measured by the quantity of electricity with which it must be charged in order to raise its electric potential from zero to unity. This condition of the circuit is of the first importance, yet there seems to be very little known concerning it so far as its effects can be determined and calculated; and the same appears to be true regarding self-induction. In fact, so far as the circuit as a whole is concerned, the ohmic resistance is the only factor which is known. Occasionally we read about the K R of the circuit, but what does that teach us about the reactances due to capacity and self-induction? Absolutely nothing. This, it would seem, is due largely to the fact of working from a theoretical basis formulated 40 years ago, when alternating currents were unknown as such. These theories are apparently considered the *ne plus ultra*, so far as multiplex circuits are concerned. A multiplex telegraph circuit is nothing more nor less than an alternating current power transmission circuit and should be studied from that viewpoint. When this is done, the problems which have confronted telegraph companies for several years and of which expert advice does not appear to have reached a solution, will be solved and not before.

As an illustration of how little is known concerning the reactances of a multiplex circuit, a recent article in Telegraph and Telephone Age in describing the effect on the neutral side of a quadruplex, when the polar side was being operated at speeds varying from fifteen to sixty words per minute, pointed out that as the speed increased the efficiency of the neutral side decreased until at sixty words per minute it had dropped to zero. The entire blame was placed upon the sending machine without any explanation as to why the high speed affected the neutral side in such a manner, except that it was due to "the high speed of dot reversals." What about the increased impedance of the circuit, this impedance increasing as the speed increased, and the value of the current dropped in consequence until it was not sufficient to properly energize the neutral relay. The value of current flowing in the line (when it does flow) is the same at all points. There is no such condition as different values at different portions of the line at the same time. This theory suggests induced currents, and is not only untenable, but does not occur in actual practice. If it should occur the effect on the signals is well known. While there is more or less inductive action between parallel circuits, the resistance is so high and the current so small, that the number of lines of force are relatively small, so much so that their effect is negligible in practice. (I am now referring to the inductive action between parallel telegraph conductors.) In connection with speed of circuits considerable is being said about the inertia of the relay armature, which is more often the effect of an unsuspected cause.

Poles, Cross Arms and Pins Purchased in 1909.

In a bulletin issued by the United States Department of Agriculture, Forest Service, dated March 10, it is shown that 2,916,005 poles were purchased by telephone and telegraph companies during the year 1909, at a cost of $4,081,251 at the point of purchase. The average cost of these poles was $1.40 per pole. Twelve and a half per cent. of the poles purchased were treated with preservatives.

Telephone and telegraph companies purchased 2,064,451 cross arms during the same period at a cost of $790,284, an average cost of 38 cents each. These companies also purchased 13,900,077 insulator pins at a cost of $161,760, an average of twelve-thousandths of a cent per pin.

In this connection it is interesting to point out that the pole problem is not by any means a new one. In a report to the president of the Erie Railroad, dated August 1, 1857, Mr. L. G. Tillotson, then superintendent of telegraph of that railroad, referring to that company's telegraph line, says: "In the original construction of the line but little attention, apparently, was given to the selection of the poles, in consequence of which large numbers are rotting, and we have been and shall be obliged to replace them, although the line was built hardly seven years since. The poles which we now purchase are of chestnut, with the bark peeled off and will last for fifteen years."

Bids Invited for Cable.—Proposals will be received until 11:30 a. m., April 18, by Captain A. S. Cowan, disbursing officer, Signal Corps, U. S. A., Washington, D. C., for 175 miles of single conductor intermediate cable, to be made in two lengths of 57 miles each, and one length of 55 miles This cable is to be consigned to the Philippine Islands.

Telegraph and Telephone Age is the oldest and most ably-conducted telegraph journal in America and should be read by every one engaged in telegraphy. Subscription price, $2 per year.

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Postal Company's Dynamo Quadruplex.

BY JOHN F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The accompanying illustration shows the main line circuits of the Postal Telegraph-Cable Company's dynamo quadruplex with the Field key system.

It will be noted that the transmitter and pole-changer are of the relay type, these instruments being in effect regular relays with back and front contacts. The sounders and keys are operated in series with these relay transmitters, the sounders being placed in resonators so located that the transmitting operator can comfortably listen to his own transmission. The Postal engineering department disociated the transmitting and sounding functions of these instruments many years ago. This separation permits the independent adjustment of the transmitting points and the sounder, so that the operator may have an adjustment of the sounder to suit without in any way interfering with the proper adjustment of the transmitting points, an arrangement impossible with the walking-beam and similar types of transmitters. The improvement in the quality of the signals following this change was marked. Placing a resonator so that the transmitting operator can comfortably follow his own sending also results in improved transmission.

On the receiving sides the sounder is brought close to the operator's ear by an extension-arm resonator, enabling him to hear the signals distinctly regardless of extraneous noise. These features have been Postal standard practice for the past ten years and have been widely copied.

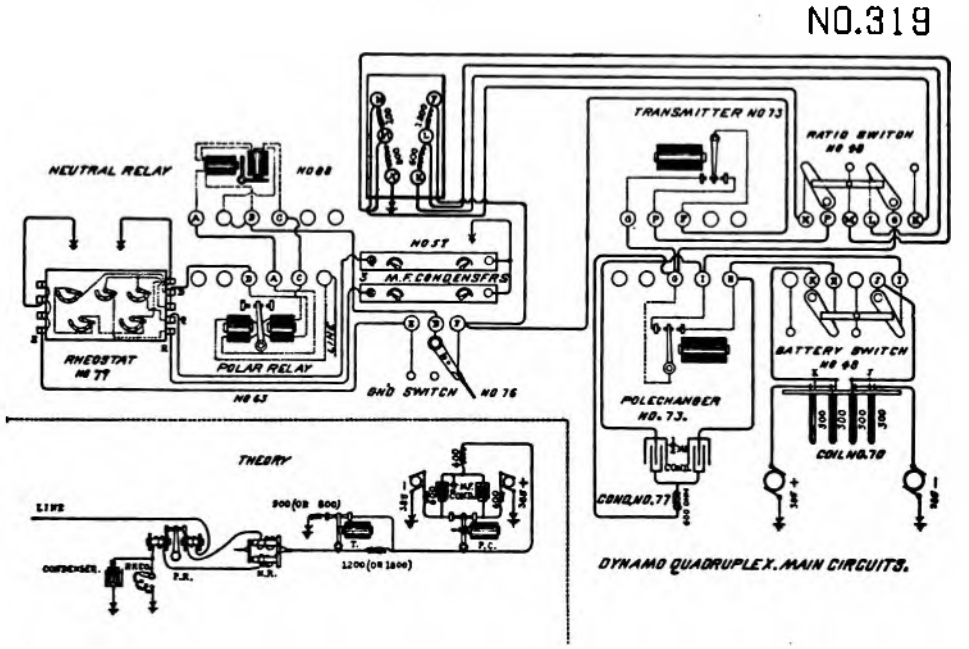

DIAGRAM OF CONNECTIONS OF POSTAL COMPANY'S DYNAMO QUADRUPLEX

Mercadier Multiplex Telegraph.—The multiplex telegraph system of Mercadier depends upon the transmission of signals by currents of differing frequencies upon a single circuit, the respective signals being sorted out at the receiving end by suitably resonant apparatus. Successful experiments were made in 1907 and 1908 with heavy metallic circuits, the Hughes apparatus being operated thus between Paris and Havre and Marseilles. Later the inventors, Messrs. Mercadier and Maguna, succeeded in working between Paris and Lyons on a single ordinary telegraph wire with earth return, three alternating current and one direct current Hughes apparatus being thus operated; and the direct current Hughes was ultimately replaced by a Baudot quadruple with complete success. Taking the capacity of the Baudot as 1,550 words per hour, and that of the Hughes as 1,800 words, the total capacity of the line was thus 17,000 words per hour. The Academy of Sciences, in recognition of the economy of line thus effected, has awarded to Mr. Maguna the Kastner-Boursault prize and the Berthelot medal.—*Journal Télégraphique.*

Hypnotism by Telegraph.—An operator by the name of Fernando Loutzenheiser recently put three young men at Canton, Ohio, to sleep by hypnotic influence transmitted by telegraph from Pittsburg, Pa. After keeping them under his influence for twenty-four hours, he awakened them by the same means. The affair was conducted with dramatic accompaniments, the three subjects taking their 24-hour nap in a show window in Canton in full view of crowds of people.

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Dinner of the Morse Electric Club.

The annual dinner of the Morse Electric Club of New York was held at the Hotel Savoy, on the evening of April 6, and it was without question the most enjoyable and successful affair ever held by that organization. Many of the most prominent officials of the American Telephone and Telegraph Company and of the Western Union Telegraph Company were present as members or guests of the club. Unfortunately the chief guest of the evening, Mr. Theo. N. Vail, president of the two companies named, was absent, having sailed for Europe a few days previously on urgent business. Everyone present deeply regretted his absence, feeling that if Mr. Vail could have witnessed the splendid gathering in his honor it would have established the utmost cordial relations between the head of the two great corporations and their employes as represented on this occasion. Mr. Vail was undoubtedly unknown personally to many of those present and all would have been happy to have met him, and no doubt Mr. Vail himself would have been delighted to have seen and met under these social circumstances the kind of men that do the actual work for the companies of which he is the head.

Everything passed off most delightfully. The elegant banquet room was brilliantly lighted, and enjoyment and good fellowship prevailed in abundance. The dais on which the guests of the club were seated was tastefully decorated, a large bed of roses at the centre forming a conspicuous feature.

Mr. J. B. Van Every, president of the club, made an excellent toastmaster, and conducted the exercises with great tact and skill. Seated with him on the dais, as guests of the club, were Col. R. C. Clowry, former president of the Western Union Telegraph Company, at his right, and Mr. Newcomb Carlton, vice-president of the Western Union Telegraph Company, at his left; Mr. Union N. Bethell, vice-president of the American Telephone and Telegraph Company, and president of the New York Telephone Company; Mr. N. C. Kingsbury, vice-president of the American Telephone and Telegraph Company; Mr. J. J. Carty, chief engineer of the American Telephone and Telegraph Company; Mr. W. H. Baker, vice-president of the American District Telegraph Company of New Jersey; Mr. G. W. E. Atkins, vice-president of the Western Union Telegraph Company; Mr. W. J. Dealy, general superintendent Commercial News Department, Western Union Telegraph Company; Mr. E. T. Jeffery, president Denver and Rio Grande Railroad Company; Mr. C. H. Wilson, general superintendent American Telephone and Telegraph Company; Mr. Henry A. Bishop, director and member of the Executive Committee of the Western Union Telegraph Company, and Mr. Job E. Hedges.

The hotel's chef provided a delicious menu which was greatly enjoyed. During the dinner an orchestra and vocalist rendered an excellent programme of music and song which aided very materially in the enjoyment of the affair.

At the conclusion of the dinner, and before the speaking began, an intermission of ten minutes was arranged, giving an opportunity to the members to indulge in social intercourse and renewal of old acquaintance.

Mr. Van Every prior to calling upon the speakers read a letter of regret from Mr. Theo. N. Vail, as follows:

"Dear Mr. Van Every: I cannot express to you my regret at my inability to be present at your dinner in consequence of an enforced absence that could not be postponed.

"I had looked forward with much anticipation to meeting again so many of the old Morse men that I knew, and meeting with many known to me in every way except personally.

"It is the younger of these men that the great development and the widening of the wire service begun by Morse will be dependent upon. In point of development measured by possibilities, or even probabilities, it is younger than the youngest of them.

"But while all these serious things must not be lost sight of I trust that the evening of the dinner will be given to that other side where wholesome frivolity and enjoyment will drive out everything except a large sense of enjoyment and that all of you will be able to look back on this evening as one of the best they have ever enjoyed.

"With my hearty good wishes and sincere regards to your other guests, I am,

"Most cordially yours,

(Signed) THEO. N. VAIL.

"P. S.—I shall be with you in thought and give you all a good toast even though absent."

The first speaker called upon was Mr. W. J. Dealy, who spoke most eloquently of the great inventor after whom the club was named. He described most graphically and interestingly the public testimonial tendered to Professor Morse at the Academy of Music, New York, in 1871.

At the conclusion of Mr. Dealy's remarks the chairman asked if any were present who attended the Morse farewell reception in 1871, if so to rise, and the following named gentlemen stood up in answer to the request: Mr. J. B. Van Every, Mr. A. R. Brewer, Mr. W. J. Dealy, Mr. E. P. Griffith, Mr. P. J. Casey, Mr. M. H. Kerner and Mr. T. M. Brennan.

Col. Robert C. Clowry was the next speaker called upon. He said that it gave him very great pleasure to be present to meet so many old friends and comrades with whom he had been so closely and intimately associated for so many years. Having occupied every position in the telegraph service from the lowest to the highest he had formed a large acquaintance with telegraph people, and the more he saw of them the better he liked them. The telegraph office, he said, was an excellent school for the training of business men. It is estimated, he stated, that 70 per cent. of the leading railroad presidents and general managers of this country graduated from telegraph offices, and a large number of other business men handled the telegraph key in their youth. He knew

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of no other large corporations that could point with more pride to the intelligence and efficiency of their employes than the telegraph companies. He expected to have the pleasure of assisting in welcoming the guest of honor, Mr. Theo. N. Vail, who unfortunately was called away suddenly to meet a business engagement on the other side of the Atlantic. With Mr. Vail, he said, it is always "business before pleasure." In conclusion he asked all to rise and join him in drinking the health of Mr. Vail.

Mr. Newcomb Carlton followed Col. Clowry. As he was comparatively a newcomer in the telegraph field he said he felt that he could not yet say much about it. He had, however, never met a more loyal, earnest and faithful lot of men than he has found in the telegraph service. Mr. Carlton is the active vice-president of the Western Union Telegraph Company and his remarks were received with much favor. He made a deep impression upon those present by the candor, force and directness of his statements, and his hearers evidently felt that they already knew the man, and heartily welcomed him to the telegraph field.

Mr. E. T. Jeffery spoke at length upon the great benefits the world at large has derived from the inventions of James Watt, George Stephenson, S. F. B. Morse and Alexander Graham Bell. Without these inventions, he said, the world would come to a standstill. He spoke of the great benefits resulting from social fellowship among officials and employes at gatherings of this kind, and suggested that it would be better if such meetings could be held more frequently and in various sections of the country.

The next speaker, Mr. Union N. Bethell, spoke in his usual forceful and happy style and was listened to most attentively. He referred to the great benefits of loyalty and organization. Organization thoroughly applied, he said, will qualify a man to fill the duties of any office to which he may be assigned.

Mr. Job E. Hedges followed Mr. Bethell with humorous remarks on the telegraph and telephone, punctuated with personal references regarding many of those present. Mr. Hedges is a prominent New York lawyer and an after-dinner speaker of national reputation.

Mr. Walter C. Burton, a former telegrapher and now a Civil Service Commissioner of the State of New York, was the next and last speaker. He dwelt upon the importance of the telegraph and his love for those engaged in the work, and paid a glowing tribute to the progressive management which has given to the public the night-letter, the day-letter and many other conveniences for facilitating transmission of intelligence.

NOTES.

The menu contained a portrait of Mr. Vail seated at his desk in his characteristic working attitude.

The menus of the club's guests were specially decorated with figures in water colors intended to represent some characteristic of the individuals. The card intended for Mr. Vail represented a man at a desk with his right hand on a telegraph key, from which a line of wires radiated, and at his left stood a telephone with a wire leading therefrom to a bell—the telephone company's well known trade mark. At the top of the card were the words, "The Hand that Holds these wires moves the World." Mr. Carlton's card contained a picture of a man in the act of pushing money along the wires, to represent telegraph money orders. The picture on Mr. Van Every's card showed a young man at a desk with papers strewn all over the floor around his chair. That on Mr. Baker's card showed a uniformed messenger boy with a telegram in his outstretched hand. On the card of Mr. Bishop was a yachting scene. Mr. Bishop is an enthusiastic yachtsman.

A lady at a telephone was the decoration on Mr. Bethell's card; and Mr. Dealy's was embellished with a stock ticker.

A locomotive decorated Mr. Jeffery's menu, and a wire with a telephone at one end and a telegraph key at the other was the representation on Col. Clowry's. Under it were the words "Good evening, Col. Clowry," in Morse characters.

Spring-time was suggested on Mr. Atkins' card, which had a picture of a youthful telegraph messenger and a young lady telephone operator seated together upon a line of wires, making love.

A man reaching out after a lot of telephones arranged in a semicircle was depicted on Mr. Kingsbury's card, and an orator at work, with a volume of steam issuing from his mouth was represented on Mr. Hedges'.

Following is a list of those present:

Albany, N. Y., Van Zant, W. H.
Atlanta., Ga., Gentry, W. T.
Baltimore, Md.—Day, E. W.; Selden, Charles.
Boston.—Barker, W. S.; Forristall, S. A. D.; Harrington, P. F.; Meigs, R. J.; Rex, J. B.; Shay, L. J.; Wilbourn, L. D.
Brooklyn—Hayden, M. I.; Hickey, G. W.
Buffalo, N. Y.—Barrett, M. E.; Baker, R. C.; Sackett, F. V.
Hartford, Conn.—Ryder, E.
Jersey City, N. J.—Dickerson, F. T.; Griffith, E. P.; Lewis, F. S.; Mombert, F. A.
Louisville, Ky.—Kern, P. G.
Monroe, N. Y.—Bertholf, J. B.
Newark, N. J.—Mulford, C. H.
New Haven, Conn.—Barth, F. W.; Russell, T. E.; Woodle, Allen.
New York—Adkins, L. M.; Austin, H. D.; Austin, W. J.; Athearn, W. E.; Allen, M. C.; Atkins, G. W. E.; Ackerly, W. J.; Anderson, E. S.; Bollson, J. J.; Brennan, T. M.; Burrill, E. T.; Brannin, E. E.; Brewer, Frank; Brewer, Orton; Brewer, A. R.; Brewer, H. C.; Beall, L. D.; Bowman, W. P.; Brixey, R. D.; Baird, E. A.; Beard, J. R.; Blanchard, George W.; Baker, William H.; Beniamin, G. R.; Berry, J. A.; Burton, W. C.; Bishop, Henry A.; Bethell, U. N.; Bethell, F. H.; Brooks, Belvidere; Bower, W. C.; Bullock, H. A.; Carmichael, A. R.; Carty, J. J.; Creamer, J. J.; Coyle, F. E.; Casey, P. J.; Casey, George Rhodes; Cockey, M. R.; Connolly, J. W.; Cook, M. J.; Carlton,

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Newcomb; Casey, John Schuyler; Chandler, A. E.; Clowry, R. C., Col.; Clarke, T. E.; Durivan, M.; Dealy, W. J.; Drummond, W. J.; Dresdner, L.; Dresdner, M.; Dierks, J. A.; Dealy, H. W.; Downs, B. M.; Durland, H.; Dealy, F. X.; Ellsworth, J. D.; English, J. W.; Emmons, H. E.; Fleming, T. E.; Foley, L. B.; Fuchs, D.; Ferguson, I. B.; Fashbaugh, W. N.; Fleming, G. W.; Ghegan, J. J.; Gott, C. C. D.; Giles, F. D.; Gallaher, E. Y.; Gibbons, J. W.; Hedges, Job E.; Heffner, H. M.; Higgins, W. G.; Holmes, William; Holmes, Dr. Wentworth; Howell, E. F.; Hamblin, M. W.; Hill, J. A.; Higgins, W. J.; Huntington, Ford; Hallock, Dr. L. R.; Haig, S. B.; Irving, Gardner; James, H. B.; Jacobson, C.; Jenkins, J. E.; Jeffery, E. T.; Johnson, C. C.; Kitton, Frank; Kline, Alexander; Kerner, M. H.; Kempster, James; Kaufman, A. C.; Kingsbury, N. C.; Kenna, M. J.; Latimer, H. S.; Ladd, J. W.; Lister, S. A.; McAllister, W. A.; McCammon, T. A.; McCann, R. L.; McClintic, F. M.; McMahon, J. W.; Morrison, J.; Moody, H. A.; Mulhall, J. T.; Murray, Col. W. A.; Murphy, C. H.; Messner, George H.; Mulford, E. M.; Marshall, William; Mathews, W. H.; Maxwell, Joseph; Murphy, R. J.; McGuire, J. F.; McRobie, John; Nachmann, Albert; Nathan, J. F.; O'Leary, M. J.; Odell, J. T.; Parkinson, Robert; Porch, Warren; Roth, D.; Rafford, C. E.; Roberts, H. E.; Rath, W. E.; Robb, James; Schreiner, George; Skelton, D.; Skelton, P. A.; Stainton, G. F.; Shinn, E. R.; Schmults, J. W.; Singleton, T. G.; Saylor, A. G.; Saylor, E. B.; Sawyer, W. A.; Spry, W. H.; Scherrer, F. J.; Stone, E. D.; Simmonds, John; Sullivan, P. J.; Schudt, W. A.; Taltavall, J. B.; Taltavall, T. R.; Tilghmann, C. R.; Van Every, H. F.; Van Every, E. B.; Van Every, J. B.; Van Zandt, W. H.; Waring, A. G.; Williams, S. M.; Wallis, O. A.; Wilson, George; Wilson, C. H.; Willever, J. C.; Wright, F. B.

Oswego, N. Y.—Doyle, J. P.
Passaic, N. J.—Johnson, C. F. H.
Philadelphia—Black, R. A.; Custer, Sheldon; Creamer, J. M.; Reed, J W.; Webb, F. R.; Crowder, Samuel R.
Saratoga, N. Y.—Waterbury, H. L.
Schenectady, N. Y.—Reynolds, A. E.
Scranton, Pa.—Collins, W. H.; Daniels, G. R.
Syracuse, N. Y.—Bierhardt, J. E.
St. Louis—McGann, George.
Troy, N. Y.—Copeland, I. W.
Utica, N. Y.—Howell, F. E.
Washington, D. C.—Collins, J. W.; Taff, H. F.

Trade Notes.

Western Electric Report.—The report of the Western Electric Company for the thirteen months ending December 31, 1910, shows gross income, $68,861,455; cost of product, $63,442,286; interest, $884,893; carried to reserves, $1,150,000; dividends, $1,700,000; surplus, $1,684,276.

Western Electric Exhibit at Railway Appliances Convention.—At the recent convention of the Railway Appliances Association in the Coliseum, Chicago, the Western Electric Company exhibited a comprehensive line of telephone apparatus and other railway material. The telephone apparatus consisted of appliances that are used in model dispatching work.

AMONG OUR ADVERTISERS.

Enlarged Quarters.—The Central Electric Company, of Chicago, has just completed changes in its quarters which will nearly double its present facilities. The offices are now on the top floor of its six-story building, and the floor space available for stock purposes has been increased by about 25,000 square feet. This will enable the company to increase both the quantity and variety of its stock, and effect other improvements in the conduct of its business. The Central Electric Company is one of the pioneer electrical houses in the West.

A New Switch.—The old electrical supply house of J. H. Bunnell & Co., 20 Park place, New York, is constantly bringing out new things. The firm first makes certain that the new goods placed upon the market meet the requirements, and this knowledge is arrived at by actual test. The latest device brought out is the Ramsay table instrument switch, which enables an operator to connect a set of instruments to any line connected with the switch. The switch is made in two sizes, one for five lines and the other for ten lines. In design it is a radical departure from the old, the switch lever being locked in position when it is set in place so that it cannot be displaced accidentally. It is said to be a time-saver, a motion saver, a temper saver, and what is generally most important, a money saver.

Light Wireless Receiver.—Mr. C. Brandes, 111 Broadway, New York, is calling attention to his wireless telegraph receiver, which is said to be an excellent instrument for long-distance service. A head receiver, unless it is very light, is likely to become extremely burdensome and irritating if carried on the head any length of time, but this one is remarkably light and meets these objections, weighing only three ounces.

Indiana Child-Labor Law.—A law has been passed by the Indiana legislature regarding child labor. It prohibits the employment of any child under fourteen years of age and those under sixteen years shall not be employed before seven a. m., and after six p. m., and not more than eight hours per day.

Mr. E. J. Comstock, manager of the Western Union Telegraph Company at Watertown, N. Y., writes: "You did right in renewing my subscription to the Age for another year."

Telegraph and Telephone Age is headquarters for all electrical books.

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KERITE

Insulated Wires and Cables

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

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

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

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

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

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

KERITE INSULATED WIRE AND CABLE COMPANY

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The Railroad.

Mr. William Bennett, superintendent of telegraph of the Chicago and Northwestern Railway, Chicago, accompanied by his wife, and Mr. C. M. Lewis, superintendent of telegraph of the Philadelphia and Reading Railroad, Reading Pa., were recent New York visitors.

Mr. John Gaul, well known in telegraph circles in the eastern states and chief operator of the Western Union office at Pittsburg, Pa., until about four years ago, when he went to California for the benefit of his health, is now manager of the telegraph department of the Santa Fe Railroad system at San Francisco.

Mr. S. A. D. Forristall, superintendent of telegraph of the Boston and Maine Railroad Company, Boston, Mass., was a recent New York business visitor. He reports that satisfactory progress is being made by the committee, of which he is chairman, having charge of the work of preparing the entertainment and business programme for the next meeting of the Association of Railway Telegraph Superintendents in Boston, June 19-23.

Extending Telephone Dispatching on Seaboard Air Line.—The Seaboard Air Line is extending its telephone train dispatching system from Wilmington, N. C., to Hamlet, N. C., a distance of 111 miles: from Hamlet to Columbia, 106 miles, and from Hamlet to Rutherfordton, 157 miles. Also from Jacksonville to Tampa, Fla., with branches to Orlando and Venice, 265 miles. Mr. W. F. Williams is superintendent of telegraph of the Seaboard Air Line, with headquarters at Portsmouth, Va.

Telephone Dispatching on Michigan Central.

Telephone train dispatching is now used on the Michigan Central Railroad between St. Thomas and Windsor, Ont., and it is expected that the lines between St. Thomas and Buffalo and between Bay City and Mackinaw will be similarly equipped during the year. Dispatchers' telephone circuits are now operated on the main line and divisions as follows: St. Thomas and Windsor, Detroit and Jackson, Jackson and Niles, Jackson and Grand Rapids, Bay City and Jackson, Detroit and Toledo and Detroit and Bay City. Eventually the entire system from Buffalo to Chicago will be furnished with telephone-dispatching equipment. Mr. J. J. Ross is superintendent of telegraph with headquarters at Detroit.

Automatic Telephone Selector or Ringing Device.

Mr. R. R. Hobbs, chief operator Louisville & Nashville Railroad Company, Louisville, Ky., has been granted a patent on an automatic telephone-selector or ringing device. The instrument consists of a polarized relay, wound to the proper resistance, operating on positive and negative electrical impulses, and a ratchet-wheel mounted on a suitable frame above the relay so arranged with arms, dog and pawl that the operation of one side of the relay armature will cause the ratchet-wheel to move one tooth in a specified direction and automatically lock the same at the point where impulses cease on that side. When the opposite side of the relay armature is worked through or by reason of electric impulse the ratchet-wheel is released automatically and a contact point is caused to touch a pin placed at the desired position on the face of the ratchet-wheel, thereby closing a local bell circuit. The ratchet-wheel is returned to normal position instantly by means of a spring, or weight, as desired, when all current ceases through both sides of the polarized relay.

This invention is designed to provide for a system of telephone ringing or signaling apparatus whereby any particular telephone station may be called without causing any of the other telephone stations on that particular line to be called, or signaled.

The primary object of the invention, Mr. Hobbs states, is to cheapen and simplify selectors. "Selectors now on the market," he states, "are good but they are expensive and complicated and are not interchangeable, in other words they are set to a certain combination and it is often impracticable to remove them promptly and substitute another of the same combination, especially on isolated divisions. Hence we believe that a selector that is not much greater in cost than a Morse relay and as adaptable to any station, will simplify the problem especially when coupled with reliability of operation, all of which it is believed the selector described will meet."

Hearing Approaching Rain Storms by Wireless.—A report has been filed with the branch hydrographic office in New York by Jules Maguy, wireless operator of the French Line steamer Niagara, in which he says he can hear rain storms at a great distance in the receivers of his instrument. "The sound," he says, "is like the pattering of rain on a zinc-covered deck, and the increasing or decreasing intensity indicates whether the squall is approaching or receding. I am so sure of this that when I hear the pattering I go quickly to the top of my wireless station to grease the insulators."

Commenting on this means of foretelling storms at sea the hydrographic office bulletin says: "The night being clear and dry, we have a cumulo-nimbus cloud loaded with electricity, positive, for example, and the sea underneath it loaded with negative electricity. At a certain instant, when the distance between the raindrop and the sea is small enough, a minute spark originates, giving a very small Hertzian wave." Every falling drop of rain is charged with positive electricity. It is declared that it is these Hertzian waves following one upon the other, or intermingled like the roar of musketry in battle, that gives the pattering effect in the wireless receiver.

TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, is headquarters for electrical books. Every telegrapher should make a study of the technical side of telegraphy. We can supply all the books needed for such study; also for the study of electrical engineering in general.

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The Turner Monument Fund.

Mr. S. A. D. Forristall, superintendent of telegraph, Boston and Maine Railroad, Boston, Mass., has sent us a portrait, reproduced herewith, of the late Charles Minot, general superintendent of the Erie Railroad, who, in the autumn of 1851, sent the first telegraph train order. This event is to be commemorated by the erection of a monument at Turner, N. Y., from whence this now historical message was sent, and a fund of $3,000 to defray the cost of the monument is now being raised. Every railroad and every telegraph man is invited to contribute toward this worthy object. Railroad men particularly should take pride in the movement as it marks an event which is of great significance to railroad interests.

The project is officially endorsed by the Association of Railway Telegraph Superintendents and the Old Time Telegraphers and Historical Association, and many prominent men actively and formerly engaged in railway and telegraph service have contributed liberally, as well as many prominent manufacturing interests.

THE LATE CHARLES MINOT.

The following named gentlemen constitute the committee in charge of the monument fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

Many commendatory letters have been received regarding the project, all the writers speaking of it in warm praise and attesting their interest by sending liberal contributions. Mr. G. L. Potter, Baltimore, Md., writes, "I think it appropriate that the memory of this important event in railroad history should be perpetuated, and am very glad of the opportunity to be among those who will help, by the erection of a monument, to commemorate the event."

Mr. John F. Mackie, secretary-treasurer of the Train Dispatchers' Association of America, Chicago, writes: "As an old telegraph operator and train dispatcher on the Erie at the time Charles Minot was general superintendent, I need not say that I am greatly interested in the matter."

Mr. Ralph W. Pope, an old time telegrapher and now secretary of the American Institute of Electrical Engineers, New York, says: "A very worthy movement for which I enclose a small contribution, which I am willing to increase if necessary at a later date."

An interesting reference to Mr. Minot's work in adapting the telegraph to the operation of trains is found in the book of the late James D. Reid, entitled "The Telegraph in America." Mr. Reid says: "Charles Minot, of the Erie Railroad, so determined on acquiring its use for running its trains as to induce him to build, in advance of any patent right, a line of his own, is a noted example. And yet it is certainly true that even to the alert western mind, it was a work of some difficulty to prove the value of the telegraph in moving and directing trains."

The contributions toward the fund received up to date are as follows:

Previously acknowledged, $1,123.25. G. W. E. Atkins, New York, $10; Col. A. B. Chandler, New York, $5.00; J. Donnelly, Baltimore, Md., $5.00; W. T. Charles, Tyrone, Pa., $.50; J. J. Loughery, Tyrone, Pa., $.50; J. N. McDonald, Tyrone, Pa., $.50; P. A. Downes, Tyrone, Pa., $.50; A. J. McLaughlin, Tyrone, Pa., $.50; H. F. Stewart, Tyrone, Pa., $.50; A. A. Witter, Tyrone, Pa., $.50; H. W. Hill, Wilmington, Del., $1.00; J. R. Donovan, Wilmington, Del., $1.00; J. L. Tucker, Pittsburg, Pa., $1.00; A. J. Schauer, Pittsburg, Pa., $1.00; C. F. Kissinger, Pittsburg, Pa., $1.00; C. J. Isler, Pittsburg, Pa., $1.00; J. A. Cook, Pittsburg, Pa., $1.00; F. Sargent, Pittsburg, Pa., $.50; T. P. Irwin, Pittsburg, Pa., $.50; R. A. McCarty, California, Pa., $1.00; S. E. Frank, Media, Pa., $1.00; F. H. Hadley, Media, Pa., $1.00; H. Calvert, Media, Pa., $1.00; G. B. Reynolds, Media, Pa., $1.00; J. H. McDonald, Philadelphia, Pa., $1.00; J. C. Johnson, Philadelphia, Pa., $5.00; Clarence H. Mackay, New York, $50.00; J. F. Howell, New York, $5.00; V. S. J. Vaughan, Franconia, Va., $.25; I. L. Tyler, Franconia, Va., $.25; I. S. Stout, Franconia, Va., $.25; S. B. Gifford, Syracuse, N. Y., $5.00; T. Welch, Port Jervis, N. Y., $1.00; M. J. Conway, Suffern, N. Y., $.50; M. Hamers, Port Jervis, N. Y., $.50; Charles T. Knight, Monroe, N. Y., $1.00; A friend of Turner's, $.50; E. B. Thomas, New York, $1.00; J. A. Middleton, New York, $1.00; F. L. Blendinger, New York, $1.00; G. A. Thompson, New

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York, $1.00; L. D. Smith, New York, $1.00; F. H. Silvernail, New York, $1.00; E. A. Albright, New York, $1.00; J. J. Teal, New York, $1.00; C. A. Austin, Jersey City, N. J., $1.00; M. A. Hullyan, Jersey City, N. J., $1.00; M. C. Roach, Jersey City, N. J., $1.00; J. M. Cherry, Jersey City, N. J., $1.00; C. W. Kinney, South Bethlehem, Pa., $1.00; F. N. Hibbils, South Bethlehem, Pa., $1.00; G. B. Minshull, South Bethlehem, Pa., $1.00; G. L. Moore, South Bethlehem, Pa., $1.00; F. N. Borker, South Bethlehem, Pa., $1.00; W. N. Estabrook, Elmira, N. Y., $5.00; C. H. Bull, Chicago, Ill., 5.00; S. S. Bogart, New York, $5.00; J. H. Gordon, Matamoras, Pa., $.25; Timothy Burns, Middletown, N. Y., $.50; F. G. Gunsands, Matamoras, Pa., $.25; Belvidere Brooks, New York, $10.00; R. S. Clark, $.50; E. C. Shannon, $.25; F. Harlson, $.25; H. E. Gilpen, $1.00; H. M. Merrihew, $1.00; J. S. Keamerer, $1.00; J. J. McNamara, $.25; S. O. Livingood, $.25; S. B. Grine, $.50; Sol. Zieve, $.25; J. D. Anthony, $.50; W. V. Bishop, $.50; W. J. Shaw, $.25; J. E. Jackson, $.25; W. R. Sibley, $.50; L. H. Geller, $1.00; M. J. Gallaher, $.50; J. T. Mullaney, $.50; P. R. Long, $.25; J. D. Brown, $1.00; Geo. L. Ross, $.25; H. D. Hileman, $.50; W. S. Cozad, $.50; W. A. Cotton, $.50; E. B. Collister, $1.00; C. G. Smith, $1.00; P. J. Dailey, $.50; C. N. Van Wormer, $1.00; W. F. Fallon, $.50; J. C. Hamilton, $.50; F. R. Thrall, $.25; A. F. King, $1.00; H. H. O. Empuy, $.50; T. H. O'Brien, $.25; Phil. Cassidy, $.25; Charles Hoffman, $.25; George Graff, $.50; A. G. Schuman, $.25; A. L. Conkey, $.25; J. G. Hausler, $.25; William M. Reakes, $.25; C. G. Heckling, $.25; J. B. Aylward, $.50; Frank Laughlin, $1.00; E. T. Gray, $.25; E. E. Ellsworth, $.50; A. H. Mansfield, $1.00, all of Cleveland, Ohio; G. H. Cannout, Lakewood, O., $1.00; K. P. Kingsley, Lakewood, O., $.50; C. E. Norway, Randall, O., $.25; Pratt & Letchworth Company, Buffalo, N. Y., $15.00; W. S. Martin, Denver, Col., $1.00; J. M. Walker, Denver, Col., $1.00. Total, $1,316.00. 316.00.

Municipal Electricians.

Patents. — Mr. J. W. Griffith, of Greenfield, Tenn., and Mr. J. H. Bruhn, Jr., of Spirit Lake, Iowa, have each been granted a patent on an automatic fire alarm.

Fireproof Building for Switchboard.—It is proposed to install the new fire alarm switchboard and appurtenances at Allentown, Pa., in a separate fireproof building instead of placing it in the central fire and police station building.

Convention of Fire Engineers.—The next convention of the International Association of Fire Engineers will be held at Milwaukee, Wis., September 19, 20, 21 and 22. Mr. Oscar D. Kleinsteuber is superintendent of fire-alarm telegraphs in that city.

Convention of Municipal Electricians. — The next convention of the International Association of Municipal Electricians will be held in St. Paul, Minn., in September, on dates to be fixed later. The influence of this association is growing from year to year, and the cities represented by its membership are deriving much benefit in the way of improved protective appliances. Mr. Clarence R. George, city electrician, Houston, Tex., is secretary of the association.

Fire Alarm Telegraphs in New York.—The proposed new charter for New York City provides that the Fire Commissioner shall have control of the construction, maintenance and use of all fire alarm telegraph, signal and alarm systems in the city. The commissioner may authorize any privately owned fire alarm system to connect or continue to be connected with the fire alarm or signal system of the department upon such terms and conditions as may be authorized by the Board of Estimate and Apportionment. The fire alarm telegraph staff is to be composed of chief telegraph operators, telegraph operators, assistant telegraph operators and wiremen.

Fire Alarm and Police Telegraph Superintendents.

The tenure of office of superintendents of fire alarm and police telegraphs is a subject that could be properly taken up and considered by the International Association of Municipal Electricians. These officials should not be liable to removal through changes of administration, because the safety and welfare of the communities concerned depend largely upon the technical experience gained by them in managing the departments under their care. The position should be subject to civil service rules and not affected by political changes.

Mr. Frank P. Foster, former secretary of the Association states that it was his constant aim to bring the Association to a point of such influence that it could make more secure the positions of these officials irrespective of the political complexion of the party in power. He desired to show the municipalities that it was to their best interests to have this important office held by men who were competent and could feel sure of their position while doing their duty. They could and would work for the best interests of the tax payers and protect them much better than would be possible if they labored under the knowledge that they would be liable to be displaced at the next change of administration.

Foreign Corporations in New Jersey.—A bill has been introduced in the New Jersey Senate to prevent telephone or telegraph companies not incorporated in that state from maintaining local lines within the state, as distinguished from through lines.

Mr. C. L. Lathrop, superintendent of telegraph and signals of the Pittsburg, Shawmut and Northern Railroad, Angelica, N. Y., in renewing his subscription for another year, says: "I thank you for renewing my subscription and will be pleased to have you do so any time that I neglect it for I wish to keep my file complete and would very much dislike to miss a copy of your valuable journal."

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Radio-Telegraphy.

Mr. Morris F. Wescoe, a wireless operator, has been appointed editor of the wireless news of the *New York Herald.*

Wireless Station at Colon, Panama.—The Congress of Panama has authorized the construction of a wireless telegraph station at Colon.

Wireless in California.—Recent storms in California prostrated the telegraph wires and it is stated that business houses in San Francisco utilized the wireless systems to reach their clients in the southern part of the State.

Music, Etc., by Wireless Telephone.—The Harvard Wireless Club at Harvard University is experimenting with wireless telephony. Conversation, songs and instrumental music on the graphophone it is stated are transmitted from the college station to the rooms of the different members with excellent results.

High Wireless Towers for Navy Department.—The Navy Department at Washington has decided to erect three or four 450-foot wireless steel towers at Fort Myer, Va., near that city. The towers will be arranged in a triangle or a parallelogram, according to the number, and with the high power contemplated will have, it is said, a radius of at least 1,500 miles.

High Wireless Mast.—The Marconi Wireless Telegraph Company has erected a steel pole and wooden mast, with a total height of 210 feet, close to its works at Chelmsford, England. The mast is to be used for experimental work in connection with high power currents.

High-School Girls' Wireless Club.—The high-school girls at Kansas City, Kan., have organized a wireless telegraph club for the study of wireless telegraphy. The building is equipped with wireless apparatus.

Mr. F. B. Barton, of Toronto, Ont., passed through New York April 5 on his way to that city after a vacation spent in Europe. Mr. Barton will fill the position of wireless operator for the large department store of the T. Eaton Company. Mr. Eaton, the head of this establishment, spends much time on his yacht in cruising about the lakes, and keeps in constant touch with business by means of wireless telegraph. His yacht is equipped with an outfit of sufficient power to keep in communication with the Toronto headquarters wherever the vessel may be.

Kites in Wireless Telegraphy.—A party conducting experiments in the use of kites in wireless telegraphy at San Francisco, Cal., claims to have heard distinctly calls from San Juan, Porto Rico; Washington, D. C.; Key West, Fla.; Brooklyn Navy Yard; Colon; Guantanamo, Cuba, and the station at Otichishi, Japan, which is 4,900 miles distant. They also claim to have detected indistinct signals which they believed were sent from Cornwall, England, a distance of 6,500 miles. The receiving aerials were strung between two pairs of 16-foot kites, which rose to a height estimated at 1,500 feet.

Subterranean Wireless Telegraphy.—Drs. Leimbach and Loewy have, according to reports from Berlin, succeeded in sending wireless telegraph messages underground between the potash mines in the North Harz Mountains over a distance of about one and one-half miles at a level of 1,600 feet below the surface.

Wireless Investigations at Pennsylvania State College.

The Engineering Experiment Station of the Pennsylvania State College, State College, Pa., is conducting some investigations in connection with wireless telegraphy. Professor Chas. L. Kinsloe who is in charge of the experiments, writes us as follows:

"Primarily, the object of these investigations is to make a more comprehensive study than has yet been made, so far as we are aware, of the wireless transmission of messages overland, especially in mountainous countries; and second, the object of our station is to furnish opportunity for experimental work in this field to the students in electrical engineering at this college.

"At present the sending equipment is of 2 kw capacity and this and the receiving equipment were manufactured by the Clapp-Eastham Company. The sending transformer is of the closed magnetic-circuit type and operates at 60 cycles. At present there is being constructed for use a 5 kw transformer of the open magnetic-circuit type which will be operated at 150 cycles. For the early experiments a temporary antenna has been erected on top of the electrical building which is at present about 90 feet above the ground and is about 100 feet between spreaders. It consists of four No. 10 wires.

"The Pennsylvania State College is located in the borough of State College in a broad valley 1200 feet above sea level and it is surrounded on all sides by numerous mountain ranges which rise to about 1000 feet above the location of the college. It is planned to erect a portable antenna at various points on these mountains and at varying distance from our sending station and since the topography varies considerably in this district, it is believed that much valuable information can be obtained. Thus far these experiments have been carried to only a limited number of points within six or seven miles of the college, but these distances will be gradually increased. It has been possible so far to receive from a number of outside stations, the most remote being a station at Cape Cod, Mass. It is proposed to erect, at a later day, a permanent antenna of such dimensions, as may be found to be best suited to the purposes and until this is done and the sending capacity is increased, it is hardly expected that much can be accomplished in sending to other stations."

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A New Telegraph System.

BY GEORGE E. HINES, NEW YORK.

A great deal has been said during the past twenty years upon the scientific properties of the telegraph, but nothing practical has been evolved which increases the operative efficiency of the polar duplex. While there have been a number of ingenious devices built upon the basic functions of this method of telegraph signaling, most all of them have failed to prove to be of greater commercial value than the original apparatus. To acknowledge the truth of these statements is not flattering to those who have spent so much time, thought, and money on new devices that have been tried and found wanting.

The telegraph differs from other electrically applied arts in that a reciprocating movement of an armature at the distant end of a circuit is desired instead of a rotary one. With this fact as a basis upon which to build it may be added that a very small amount of magneto motive force through a circuit is required to move a relay armature, provided we can reverse the direction of electromotive force through the circuit, which is not done at the present time.

Facts of condition must be adhered to, and the true relative electrical condition of earth, forming one part of our telegraph circuit, and air, the medium through which the other part is established, have become widely diffused during the past few years of commercial activity. So much so that interruptions of the telegraph are as frequent as the electromagnetic condition changes in any part of the circuit due to various natural causes. The cause of these interruptions are understood and can be prevented if proper means are provided to bring the electromagnetic functions of the two parts of the circuit to act in accord instead of in opposition to each other. When weather conditions are favorable the duplex works all right, but when the line is made heavy by rain or fog, or the condition of the earth side of the circuit is interrupted, our present method fails.

Now, the electrical reactory terms, capacity, inductance, and resistance, have about as much to do with the operation of the telegraph as the differential calculus has to do with gravity. They are good things for study but do not help the telegraph or gravity do their work. Indeed, before we can proceed to transmit the first signal through a telegraph circuit, we are compelled to neutralize the reactory effect of these quantities by dividing the line side of the circuit into three parts and maintaining a state of resonance in each and between the parts, nearly perfect, else we do not get satisfactory results.

Remembering that our purpose is wholly to create a magnetomotive force through a circuit of known resistance strong enough to move a delicately mounted relay armature seemed to the writer to be a simple proposition but requiring a simpler arrangement of both circuit and applied electromotive force than that now used. These conditions, the writer believes he has met in his newly devised system of duplex and quadruplex telegraphy which was described in Telegraph and Telephone Age of April 1.

Mr. Jerry Foley, of the Postal Telegraph-Cable Company's office at Indianapolis, Ind., is a candidate for the position of official telegrapher for the House of Representatives at Washington.

Obituary.

Joseph J. Lawlor, aged 35 years, formerly chief operator for the Hearst news service in New York, and afterward manager of the Atlantic Telegraph Company at Portland, Me., died in the latter city, April 10. Mr. Lawlor went to Chicago for the Western Union Telegraph Company, but returned to Portland a year ago on account of ill-health.

William A. Dunn, an operator at Baltimore, Md., died in that city March 28, at the age of sixty-eight years.

The R. W. Martin Fund.—We have received from Mr. H. C. Richardson of Metuchen, N. J., an old-time operator, a check for $2.00 for Mr. R. W. Martin, who has been confined to his bed for several years suffering from a stroke of paralysis, and is helpless in consequence.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

The new song, "Send Me a Night Letter, Dearie," composed by Mr. B. L. Branman of this office, was sung with excellent effect at the dinner of the Morse Electric Club on April 6.

PHILADELPHIA, WESTERN UNION.

Mr. Anthony J. Neyer of this office has gone to Baltimore, where he has entered the service of this company at that point.

Mr. Harry V. Emanuel and Mrs. George W. Uber, both of the operating force in this office were married on March 25.

Many new faces are appearing in the operating room, which is evidence that business is on the increase. It promises to be good during the spring and summer.

PHILADELPHIA, AMERICAN TELEPHONE AND TELEGRAPH.

Mr. Chester J. McKee, test-board man, has resigned and is now engaged in the telephone business at Rush, N. Y. While in this office Mr. McKee made many friends.

Mr. Bernard Stohner, early night test-board man, has been transferred to the district office. Mr. Morris Ruberg, repeater man, succeeds Mr. Stohner, and Mr. Daniel Hoffman, of the clerical department, has been transferred to the repeater department to succeed Mr. Ruberg.

ATLANTA, WESTERN UNION.

Mr. A. H. Condra has been transferred from the plant department to be night chief operator, vice Mr. E. Waldron, transferred to the plant department.

Mr. E. G. Clinkscales, assistant day repeater-chief, has been transferred to be night repeater-chief, vice W. A. Reynolds. Mr. Reynolds is now assistant wire chief, days.

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Mr. W. O. Ballard, assistant wire chief, days, has been appointed day wire chief, vice A. H. Condra.

Mr. E. E. Cunningham has been appointed assistant repeater chief, and Mr. T. E. Argo has been appointed chief in charge of repeaters.

On Monday, March 27, this office handled the largest volume of business in its history.

New York Telegraphers' Aid Society.

At the annual meeting of the New York Telegraphers' Aid Society on March 29 the amendment to the constitution relating to the limitation of benefits that may be paid out during a period of forty-eight months was defeated. The matter will probably be again brought to the consideration of the society in a modified form next year.

Mr. R. J. Marrin, president of the society, feels highly honored over his election for the third consecutive term, this time without opposition. He has been faithful to the interests of the society and has made a capable head. The society has prospered under his leadership and no doubt the year 1911 will show still better results. The members have, in the re-election of Mr. Marrin, expressed in a very emphatic and complimentary manner their confidence in his ability to conduct the affairs of the society, and Mr. Marrin is to be congratulated on so great a distinction being shown him.

Messenger Boys Robbed.—Three young men, armed with revolvers, entered the Western Union Telegraph office at 91 Wall Street, New York, on March 27, and robbed twelve messenger boys of their money and valuables. It was pay day and the boys were preparing to go home after their day's work when the "hold up" took place.

The Associated Press.

Philip H. Kerby, aged 50 years, private secretary to Mr. Melville E. Stone, general manager, New York, died suddenly while teaching his Sunday-school class, April 2.

Col. Charles S. Diehl, assistant general manager at Chicago for the past eighteen years, and Mr. Harry B. Beach, superintendent of the Central Division, Chicago, have resigned to take up the management of the San Antonio *Light*, San Antonio, Tex., which they have purchased. Col. Diehl's service with the Associated Press covers a period of twenty-eight years, while that of Mr. Beach covers twenty years.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York. 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

Mr. F. M. McClintic, the well-known telegrapher, and manager of a stock brokerage office in New York, has decided to give up his brokerage position and embark in the moving-picture show business. For over a year Mr. McClintic has been managing the Park Row Theatre in New York, and is now part owner in the enterprise. This theatre has gained an enviable reputation for the high-class pictures exhibited there and Mr. McClintic is very proud of its success and standing, which are largely due to his own efforts and good judgment in the selection of pictures and arrangement of the programmes. He has a large circle of telegraph friends who will wish him much success in his new line of work.

Martin's Double Lever **VIBROPLEX**, $8.00 f. o. b. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

WANTED.—Live agents in all large Western Union and Postal offices. Central Typewriter Exchange, New York.

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.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 9. NEW YORK, MAY 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY—XVII.

BY WILLIS H. JONES.

Little Things That Count.

(Continued from April 16 issue.)

In the preceding instalment of this article the vibratory transmitting machine was made the subject-matter, to illustrate how a systematic order of instructions given to operators concerning its operation would not only raise the efficiency of the telegraph service by increasing the capacity of each wire on which such a machine is used, but add greatly to the comfort of the operators themselves.

Now, the suggestions made to remedy the evil were little ones, and the transmitter trouble itself was shown to be a very small defect, taken by itself, yet owing to the frequency with which the fault occurs and the number of machines in simultaneous use the accumulative harm done is great. Hence each little unit of a harm-creating tendency might be taken up separately in the official schools of the company and made a subject for special instruction, with beneficial results to all concerned.

For the second lesson the writer suggests the importance of impressing all operators with a sense of personal obligation and responsibility to the company for certain little (yet cumulatively great) sources of delay which they could minimize if they really had their employer's interest at heart and took the trouble to do so.

For instance, there is probably no operator so dense that he does not know that a loose wire connection in a binding post will cause trouble, and only few who are not aware of the fact that ink or dirt on a switch disk either opens the circuit or weakens the current, yet it is seldom that any of them discover such faults because they imagine the remedy is "up to the chief."

Furthermore, if such an operator were accused of being not "first class" he would probably be much offended, yet it is evident by his conduct that he is not. Many operators now rated second class may possibly be more valuable to the company and therefore more desirable.

One of the easiest ways that an operator might make himself valuable is to cultivate the habit of examining the various binding-post connections whenever he sits down to a desk. Should the circuit open later this examination should be made first thing. It requires only a moment to do this, while the general adoption of this practice would undoubtedly prevent a great many of the unnecessary delays now experienced in moving traffic which are due to the lack of observation.

Moreover, operators should realize the fact that as there are a multiplicity of binding-post connections to be looked after, a little help on their part in the way suggested is really necessary in order to maintain a maximum equipment-efficiency.

A retractile spring on a telegraph relay is a very insignificant looking part of the outfit, yet its abuse creates a source of delay to traffic every wet day that is hardly appreciated fully. Springs that have lost their original elasticity by having the close fitting "curls" stretched are almost as useless as a string would be if substituted therefor.

In large main offices where apparatus are inspected frequently springs are not often allowed to reach that condition before being renewed, but in way stations the contrary condition often prevails.

A case in point: Not long ago the writer while visiting an operator at a way station heard a station beyond call up his friend and request him to "pull up" and answer Philadelphia. After a very careful readjustment of his relay he finally succeeded but the signals came very indistinctly and the slightest alteration of the spring tension caused them to disappear. After he finished with

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Philadelphia he explained that he guessed he had a pretty "bum" relay as none of the other stations along the line seemed to experience any trouble of that nature.

Happening to glance at the retractile spring on the relay the writer noticed that it was stretched out so that it looked like a straight piece of wire. There was not a "curl" in it. Luckily the writer happened to have a relay spring in his pocket and quickly substituted it for the old one. From that moment the operator had no further trouble hearing and reading the signals from any point along the line.

Asked how long he had been bothered that way he replied, "Ever since I came here, and I have been here six months."

Just think of it! six months of delays and more or less bother and trouble for every other operator on the circuit who happened to have business for him, and all due to a little thing like a retractile spring.

Now all operators should realize the fact that no retractile spring not possessing closely fitting curls is capable of following, or keeping in step, with the minute fluctuations in the magnetic strength of the relay which take place in very wet weather at way stations situated remotely from the battery. Naturally the volume of current that reaches such points is very small compared to that received in dry weather; hence the spring should possess great elasticity. For best results the tension of the spring should be very slight, just sufficient to keep it taut, and it should be kept that way regardless of the weather or volume of current flowing through the relay coils. All readjustments should be done by moving the magnet itself toward or from the armature, as the occasion demands. The spring tension itself should never be altered except to give the final touch.

Recent Telegraph and Telephone Patents.

ISSUED APRIL 4.

988,706. Telephone Receiver Shell. To J. Halldow, Elyria, Ohio.

988,711. Central Telephone System. To J. D. Holmes, Pasadena, Cal.

988,811. Telegraphy. To L. M. Potts, Baltimore Md.

988,819. Telephone Transmitter. To C. R. Rogers, Waverly, N. Y.

988,876. Telephony. To I. Kitsee, Philadelphia, Pa.

988,878. Cable Telegraph System. To I. Kitsee, Philadelphia, Pa.

988,879. Telegraphy. To I. Kitsee, Philadelphia, Pa.

ISSUED APRIL 11.

989,191. Multiple Telephone Receiver. To W. B. Relth, Chicago.

989,205. Telephone System. To D. L. Temple, Chicago, Ill., and C. L. Goodrum, Altantic City, N. J.

989,529. Conversation Meter for Telephone Systems. To G. W. Lorimer, Piqua, Ohio.

The following patents have expired:

517,445. Coin-Controlled and Coin-Return Lock for Telephones. Issued to J. M. Dashiell, Jr., Washington, D. C.

517,762. Telephone. Issued to S. D. McKelvey, Canton, Ohio.

517,763 and 517,764. Magneto Telephone. Issued to S. D. McKelvey, Canton, Ohio.

518,142. Telephone Transmitter. Issued to J. Goodman and H. M. Goodman, Louisville, Ky.

Personal.

Mr. J. Levin, of Atlanta, Ga., formerly general superintendent of the southern division of the Western Union Telegraph Co., was a recent New York visitor.

Dr. Karl G. Frank, New York, representative of the Siemens and Halske Company, Berlin, Germany, sailed for Europe April 27. He will be absent about four months.

Mr. Harry E. Dunham, former associate editor of Telegraph and Telephone Age, was a recent New York visitor. Mr. Dunham is now an examiner in the Patent Office at Washington and finds work and life in the capital very congenial.

Mr. Joseph W. Stover, an old-time telegrapher and formerly president of the Gamewell Fire Alarm Telegraph Company, New York, has the sympathy of his many friends in and out of the telegraph profession in the death of his wife at their home in East Orange, N. J., on April 7. Mrs. Stover had been ill for a long time.

Mr. Charles R. Williams, who, twenty or more years ago was assistant general manager of the Associated Press, New York, afterwards becoming editor-in-chief of the Indianapolis *News*, has decided to give up newspaper work and devote his time to the compilation of a history of the life of the late president Rutherford B. Hayes. Mr. Williams was formerly professor of Greek at Lake Forest (Ill.) University, and tutor in Latin at Princeton University.

Mr. William McClellan, a well-known electrical engineer and a man of wide technical experience, has been appointed consulting electrical engineer for the Public Service Commission, Second District, New York, to succeed Mr. Howard H. Crowell, resigned. Mr. McClellan is a graduate of the University of Pennsylvania, and has been connected with the work of electrification of several large railroads. He is a member of all of the technical engineering societies.

Mr. B. M. Downs, vice-president of the Brookfield Glass Company, New York, was recently tendered a complimentary dinner by his associates, Messrs. H. M. and F. Brookfield, to mark the completion of his twenty-five years' service with that company. Twenty-one gentlemen were

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present at the dinner and an enjoyable time was had. Mr. Downs, who is now on a business trip to the Pacific Coast, was heartily congratulated by all present. Many telegraph people were present.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mrs. John W. Mackay, wife of the late president of the Postal Telegraph-Cable Company, and her daughter, the Princess Colonna di Stigliano, of Rome, Italy, recently arrived from Europe on a visit to New York.

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

Miss T. N. Brown, chief clerk to vice-president and general manager E. J. Nally, who has been absent on account of illness, has returned to her office.

Mr. E. B. Pillsbury, general superintendent, has returned to New York after a brief absence on company business.

The Mackay Telegraph and Cable Company is actively engaged in building new lines in Texas. The line between Galveston and Houston is being built along the right of way of the Atchison, Topeka and Santa Fe Railway. It is expected that the new lines will reach Dallas by June 1. Beautiful offices will be established in that city and location for offices have been secured at Fort Worth, Galveston, San Antonio and at other places.

The fourth annual outing of the Association of Postal branch-office managers in the first district, New York, will be held at Witzel's Point View, College Point, L. I., Saturday, June 24. Mr. C. F. Leonard, district superintendent, New York, will be the guest of honor. There will be games in the afternoon at which valuable prizes will be awarded, and in the evening there will be a dinner followed by a vaudeville entertainment, composed entirely of Postal talent. These meetings are held primarily for the purpose of getting together for the exchange of views on business affairs.

Mr. J. A. Vogt has been promoted to be manager of the Baltimore, Md., office, vice Mr. V. J. Albert, resigned.

Among recent executive-office visitors were: Superintendents H. Scrivens, Pittsburg, Pa.; C. A. Richardson, Boston, Mass.; C. E. Bagley, Philadelphia. Managers C. A. Johnson, Meadville, Pa.; S. H. Flint, Bridgeport, Conn.; C. E. Diehl, Harrisburg, Pa.; J. A. McNichol, Philadelphia, Pa.; F. B. Travis, Washington, D. C.; N. C. Pangburn, Albany, N. Y.; J. A. Coughlan and Geo. Downey, Boston, Mass.

Mr. George H. Mills, manager of the Providence office of this company, was a recent New York visitor.

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 New York, New Haven and Hartford Railroad to succeed Nathaniel Thayer, deceased.

Mr. G. D. Perry, vice-president and general manager of the Great North Western Telegraph Company, Toronto, Ont., was a recent New York visitor.

Mr. T. W. Carroll, assistant to the general manager, New York, has returned from an inspection trip in the West.

Mr. W. E. Athearn, engineer of equipment, has returned from a short business trip through the southern division.

A meeting of the Commercial Managers Association of New York was held a few days ago and plans were perfected for semi-monthly meetings, for the benefit of the service. Mr. James F. Nathan, superintendent of city offices, presided in the absence of Mr. P. J. Casey who was on a trip to Florida.

Mr. T. A. Thorp has been appointed equipment man at Boston.

Mr. C. B. Kelley, manager of the Burlington, Vt., office, has been promoted to be manager at Springfield, Mass.

Mr. Rollo D. Welch, of Chicago, has been appointed chief operator of the Kansas City, Mo., office, vice Mr. S. W. Atkinson retired to engage in other business.

Mr. R. C. Mason, of the Bell Telephone Company of Pennsylvania, Philadelphia, has been appointed special agent to assist district commercial superintendent J. W. Reed, of that city.

Mr. C. W. Garver, manager at Ashland, Ohio, has been transferred to the managership of the Youngstown, Ohio, office, succeeding Mr. H. L. Herbert, resigned, to go with the Postal Company at the same point. Mrs. C. W. Garver is acting manager at Ashland.

Mr. A. Simon, manager of the 65 Gold Street office, New York, has been advanced to the position of solicitor and attached to the 16 Broad Street office. Mr. Louis Westrope, of the superintendent's office, has been appointed manager of the 65 Gold Street office.

Mr. Allan Woodle was tendered a farewell dinner on his retirement as manager of the Boston office by the heads of the various departments and many of the employes. Mr. O. A. Connor, who succeeded Mr. Woodle as manager, was also a guest at the dinner. Several congratulatory addresses were made. Superintendent C. F. Ames acted as toastmaster.

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Mr. Joseph Marshall, chief operator of the Western Union Telegraph Company at Charleston, S. C., is giving instructions on the construction and operation of telegraph apparatus, office connections, etc., to a number of the operators in that office who have taken an interest in the technical side of telegraphy. Meetings are held regularly and good progress is reported.

Mr. V. J. Albert, manager of the Postal Telegraph-Cable Company at Baltimore, Md., has accept the position of commercial manager of Maryland for this company, with headquarters in that city.

Thomas P. Scully, aged 74 years, one of New York's veteran telegraphers, died April 25. Mr. Scully had been identified with the telegraph service in this city for the Western Union Telegraph Company as a printing operator since 1851. He was a man of commanding presence. He had traveled extensively both in North and South America and all over the continent of Europe. He was president for a number of years of the North Western Telegraph Company and he held other positions of responsibility during his long and active career. He retired from active duty ten years ago since which time he lived in Brooklyn.

Mr. William John Francis, whose promotion to the managership of the Atlanta, Ga., office was announced in our issue of April 16, was born at Old Point Comfort, Va., August 23, 1865, and began his telegraphic career at that place in 1878. His entire business experience has been in the South. He was manager for a brokerage house in Atlanta, Ga., and afterwards became manager of the Western Union offices at Macon, Ga., and Montgomery, Ala., holding the latter position at the time he was transferred to Atlanta.

Mr. Charles Elmer Thatcher, chief of the transportation rate section in the Treasury Department, Washington, D. C., has been appointed manager of the Western Union Telegragh Company, San Francisco, Cal. Mr. Thatcher was born at Mount Sterling, Iowa, December 11, 1869, and entered the telegraph service in Washington, D. C., in August, 1889. He has filled positions as operator, manager, chief clerk, and train dispatcher in Western Union offices and on railroads and entered the government service in Washington in 1898. There he studied accounting and economics of transportation at the George Washington University, and aided in the organization of the transportation office of the United States Treasury Department. Mr. Thatcher was transportation agent for the government at the Jamestown and Seattle expositions.

Telegraph and Telephone Age is the oldest and most ably-conducted telegraph journal in America and should be read by every one engaged in telegraphy. Subscription price, $2 per year.

Gardner Irving Appointed Superintendent Commercial News Department, New York.

Mr. Gardner Irving, who has just been advanced to the superintendency of the Commercial News Department of the Western Union Telegraph Company, New York, and whose official appointment was recorded in our April 16 issue, was born in Greenport, N. Y., in May, 1855. He began his telegraphic career as a messenger for the Atlantic and Pacific Telegraph Company at Hudson, N. Y., in 1868, and afterwards became engaged in other lines of business but returned to the telegraph service March 21, 1871, at Hudson, N. Y. On the opening of the Grand Central Depot in New York, November 1, 1871, he was promoted to the superintendent's office. He soon afterward entered the service of the Western Union Telegraph Company at 145 Broadway and after some years' experience in the cable department he was, in 1882, appointed traffic chief of the Southwestern Division. In 1885 he was appointed chief operator of the Commercial News Department and in 1905 was made manager of that department. Mr. Irving has had a wide experience with quadruplex, Wheatstone, ticker and transmitter systems and has been largely instrumental in the development of the quotation service. He is an unassuming gentleman and is very popular among his associates and business connections. He is a charter member of the New York Telegraphers' Aid Society and has all through its career been an active member of this worthy organization, of which he was president for six years. He is also one of the original members of the Magnetic Club and is a director of the Morse Club and chairman of its reception committee. Mr. Irving has been vice-president of the Gold and Stock Life Insurance Association for five years.

GARDNER IRVING.
Superintendent Commercial News Department, Western Union Telegraph Company, New York.

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Radio-Telegraphy.

Mr. T. C. Harlan, wireless operator for the United Wireless Telegraph Company on the Great Lakes during the last year, and manager of the Western Union Telegraph office at Trenton, Mo., during the winter, is now taking an extended vacation at Newville, Pa., for the benefit of his health.

Wireless Telegraphy in Spain.—A company has been formed in Spain to establish public wireless telegraph service in that country and on vessels in Spanish waters. Stations with large range will be established at Cadiz, Las Palmas, Teneriffe, Madrid, Barcelona, the Balearic Islands, and other points.

Marconi and French Wireless to Exchange Messages.—A dispatch from Paris states that the French Minister of Public Works has signed an agreement with the Marconi Company for an exchange of wireless communications both on sea and ashore between the Marconi stations and others fitted with the French wireless system.

Secret Wireless Telegraphy.—Johann Sacek, of Prague, Bohemia, has devised a system of wireless telegraphy which, it is stated, prevents the interception of wireless messages by outside parties. The system has been tested at the Darmstadt Technical High School and is said to represent real progress in wireless telegraphy.

Society of Wireless Telegraph Engineers.—The following named officers of the Society of Wireless Telegraph Engineers were elected at the recent convention held in Boston: President, Mr. Fritz Lowrenstein; vice-president, Mr. Louis Cohen; secretary, Mr. E. B. Moore, 39 Trinity Place, Boston; treasurer, Mr. V. F. Greaves; directors, Messrs. Samuel Cabot, F. H. Knowlton and George Hill.

Wireless on a Stranded Steamer.—The wireless telegraph played a very important part in keeping in close touch with the German steamer *Prinzess Irene* which ran ashore recently off Fire Island, on the Long Island coast. Progress in the work of rescuing the passengers was reported frequently by wireless, and events and happenings on the vessel were known to the outside world as quickly as if the ship had been lying quietly at her dock. The busiest place on the ship was the telegraph office and the receipts ran into thousands of dollars.

Wireless Along the Mexican Border.—Five hundred miles of territory along the borders of the Rio Grande in Texas are covered by the wireless system, in connection with the Army now stationed along the Mexican border. The work of installing the system was performed by the Signal Corps. In connection with the Eagle Pass wireless station, which is a permanent one, three field stations were established, 100 miles apart. Two signal-corps men are posted at each of the three sub-stations and at the Eagle Pass station. The system was mapped out by Major George O. Squier, in command of the Signal Corps at the division camp.

Range of Wireless Telegraphy.

In a recent address Captain H. R. Sankey of the British Army gave the following figures representing the range in nautical miles attainable in wireless telegraphy over sea and over land by apparatus of different powers:

Power in K.W.	Wave Length Meters.	Over-sea.	Over Land		
			Flat.	Hilly.	Mountainous.
0.3.....	300	100	77	30	13
0.3.....	1200	100	95	73	52
1.5.....	300	220	170	67	28
1.5.....	1200	220	210	160	115
3	300	280	220	84	36
3	1200	280	270	200	145
5	300	340	260	100	43
5	1200	340	325	240	175
10	300	470	360	138	59
10	1200	470	450	330	240

Hertzian Waves.

In an address before the Southern Commercial Congress at Atlanta, Ga., on March 10, Mr. George Westinghouse made some interesting references to the possibility of wireless transmission of electrical energy. He stated that the frequency of the electrical waves sent out by some forms of wireless transmitters approaches a million per second and that either by the increase in the amplitude of these vibrations or by a more sensitive receiver the distance which these waves may record can be greatly increased. Dr. Peter Cooper Hewitt had, he stated, made an experiment with powerful wireless transmission apparatus which produced incipient fires within the room where the apparatus was erected, thus demonstrating the power of this incomprehensible force and suggesting great possibilities in the transmission of electrical energy without wires.

Referring to radium phenomena, Mr. Westinghouse stated that during a conversation with the late Lord Kelvin he ventured to give a conception of the cause of the production of heat by radium, his idea being that radium acts as a transformer of one of the forces of ether into some other form of force and that in such transformation heat is produced. Lord Kelvin stated that he had already arrived at the same conclusion on the general hypothesis that neither heat nor light can be produced without energy.

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Magnetic Club Spring Dinner.

The spring dinner of the Magnetic Club was held at the St. Denis Hotel, New York, April 26, and was largely attended, and a very enjoyable time was had by all.

The entertainment features were especially good and of a high order, and the debut of the Magnetic Glee Club under the guidance of Mr. Lewis MacConnach was an instant success, and added much to the enjoyment of the occasion.

The club had as its guests the editors of the various electrical papers in New York, including Mr. C. W. Price, of the Electrical Review and Western Electrician, Messrs. J. B. Taltavall and T. R. Taltavall, of Telegraph and Telephone Age, and Mr. D. D. Moore, managing editor of the Times-Democrat, New Orleans, La.

In introducing the speakers President C. P. Bruch made some felicitous remarks.

"In the course of a moderately long and somewhat varied career," he said, "I have found it necessary to undertake several kinds of occupation, but it was not until recently that I was called upon to exercise editorial functions. As a result of my experience in that connection I have acquired a very broad and deep sympathy, not to say pity, for that unfortunate class of individuals —editors.

"I now realize," Mr. Bruch continued, "that the editor is continually between the 'devil and the deep sea,' the 'devil' being the compositor and the 'deep sea' the reader."

He hoped that the guests had enjoyed their brief respite from their normal condition of unappeased hunger and lack of shelter, and proposed to add to their happiness by asking them to make brief addresses.

Short addresses were then made by Messrs. J. B. Taltavall, C. W. Price, D. D. Moore, M. J. Pike and Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company.

Following the addresses a short intermission was taken to prepare for the vaudeville entertainment and the opportunity was taken advantage of to indulge in social intercourse and make and renew acquaintances.

The entire affair was well arranged and executed and everyone present spent an enjoyable evening. There was no restraint whatever, and there was a real "home" feeling all round. The dinner was an excellent one, and the entertainment was all that could be desired and a fitting termination of a happy evening.

Those present were:

Albany, N. Y.—N. C. Pangburn.

Boston, Mass.—J. A. Coughlan, Geo. Downey, C. A. Richardson.

Bridgeport, Conn.—S. H. Flint.

Harrisburg, Pa.—C. E. Diehl.

New Orleans, La.—D. D. Moore.

New York.—J. J. Alcock, W. P. Bowman, C. P. Bruch, J. Bigger, M. R. Cockey, W. I. Capen, T. L. Cuyler, Jr., S. Cohen, J. Costello, J. J. Cardona, F. W. Daly, T. J. Donovan, M. L. Dunn, W. B. Dunn, A. J. Eaves, A. P. Eckert, E. J. Edwards, J. H. Flood, W. Finley, W. J. Fives, R. Gould, J. F. Gaynor, J. J. Ghegan, W. R. Holligan, Thos. J. Howlett, J. Hennessy, T. E. Heffren, P. A. Hickey, L. L. Howell, Dr. L. R. Hallock, J. C. Johnson, E. Kimmey, F. J. Kernan, S. C. Kniffin, L. Lemon, C. F. Leonard, A. J. Lafaye, D. F. Mallen, F. E. McKiernan, Wm. Marshall, R. H. Miller, W. H. Mishner, J. J. McCormick, J. J. McDermott, T. J. McQuillan, E. F. Maher, J. A. Manning, J. McNeill, J. McCauley, J. Moran, L. MacConnach, F. Morris, E. J. Nally, E. B. Pillsbury, Fred. Pearce, C. F. Pearce, C. W. Price, M. J. Pike, W. F. Pelton, D. F. Regan, J. J. Reilly, H. J. Reinhardt, R. R. Rosa, E. J. Rhates, Thos. F. Rochford, J. F. Shugrue, J. Shandley, Wm. Scarborough, H. Scrivens, C. Shirley, W. F. Stanz, T. J. Sullivan, E. P. Tully, T. R. Taltavall, J. B. Taltavall, V. H. Wiese, H. Wiese, A. G. Williams, P. J. Walsh, H. Zweifel.

Philadelphia, Pa.—J. A. McNichol, C. E. Bagley, A. E. Zintl.

Washington, D. C.—F. B. Travis.

Mr. Union N. Bethell, vice-president of the American Telephone and Telegraph Company, and president of the New York Telephone Company, gave a dinner party recently at his home in Upper Montclair, N. J., during which he entertained his guests by telephone conversation with Denver, Col., and other points. Speeches were made from Boston, Washington, Chicago, Detroit and Denver. There were also songs, and Ben Greet gave readings. Each guest was provided with a head receiver so he could listen to the entertainment.

The Cable.

Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company, New York, has returned from his excursion to the West Indies, greatly benefited by the trip. He has fully recovered from his recent illness and is again hard at work.

British South American Cable.—The Birmingham, England, Chamber of Commerce is collecting the opinions of other English Chambers of Commerce regarding a proposition that a British submarine cable all around South America is a necessity in order to counteract the efforts now being made by the United States to promote American trade.

Mr. J. C. Browne, general foreman of the Missouri Pacific Railway System at St. Louis, Mo., writes: "Sometimes we do things from habit and sometimes because it is necessary. I herewith renew my subscription to Telegraph and Telephone Age because it is necessary."

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WESTERN DIVISION OFFICIALS OF THE POSTAL TELEGRAPH-CABLE COMPANY*

CHAS. M. BAKER,
Div. Gen. Supt. Plant, Chicago.

GUY E. PAINE,
General Superintendent, Chicago.

S. H. MUDGE,
Division Superintendent, Chicago.

HARRY C. SHAW,
Div. Elec. Engineer, Chicago.

HIRAM G. McGILL,
District Superintendent,
1st District, Chicago.

EDGAR W. COLLINS,
District Superintendent,
2nd District, Cleveland.

ALBERT L. LAFFERTY,
District Superintendent,
4th District, Chicago.

JOHN F. LOONEY,
District Superintendent,
3rd District, Chicago.

ALPHEUS B. RICHARDS
District Superintendent,
5th District, Kansas City, Mo.

WM. P. S. HAWK,
District Superintendent,
6th District, Chicago.

WM. C. BLACK,
District Superintendent,
7th District, Denver, Col.

CURTIS A. COMSTOCK,
District Superintendent,
8th District, Chicago.

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SOUTHERN DIVISION OFFICIALS OF THE POSTAL TELEGRAPH-CABLE COMPANY *

JESSE HARGRAVE,
Division Superintendent,
Atlanta, Ga.

GEO. H. USHER,
General Superintendent,
Atlanta, Ga.

C. H. ASHBURN,
Superintendent,
1st District,
Atlanta, Ga.

G. W. RIBBLE,
Superintendent,
2nd District,
Atlanta, Ga.

C. B. ARRINGTON,
Superintendent,
3rd District,
Atlanta, Ga.

W. C. DAVIET,
Superintendent,
4th District,
Atlanta, Ga.

B. S. PRICE,
Superintendent of
Construction,
Atlanta, Ga.

* Cuts loaned by the *Postal Telegraph*

Handling of Dry Cells.

Dry cells are commonly regarded as mechanically indestructible and are consequently subjected to rough handling, says *The Pacific Telephone Magazine*. Contrary to their name, dry cells are not dry, but are so sealed as to expose no damp surface to view. A dry cell consists of the two elements, carbon and zinc, also a metallic salt solution which serves as an electrolyte and a depolarizing agent immediately surrounding the carbon. The active solution is prepared in the form of a paste and saturates a porous paper used as a filler between the elements. The deterioration of cells is due to chemical action and evaporation of the electrolyte. The effectiveness of a cell is dependent on a low internal resistance and a high electromotive force, both of which are adversely affected by abnormal chemical action and evaporation directly traceable to improper handling.

The following precautions should be of assistance in preventing premature deterioration. Barrels containing cells should be wheeled on a truck, not rolled. Cells should be kept in an upright position, whether in barrels, on shelves, etc. Do not throw cells into a wagon or allow them to bounce around during transportation. Cracks found in the sealing compound should be seared with a hot iron to prevent excessive evaporation. Do not test a cell by short circuiting it to get a spark, as you will shorten its life. Tests and maintenance of dry cells should conform to a standard practice. Keep stock cells in a cool place to reduce evaporation.

Dry cells are perishable and considerable care must be taken in maintaining stock so that cells will be placed in service within three months, and preferably two months, of the date of manufacture stamped on the paper case.

The "Marconigraph." — Marconi's Wireless Telegraph Company, Ltd., London, England, has just begun the publication of a magazine entitled the "Marconigraph," the aim of which is to set forth in detail all the interesting happenings incident to the development of the system and to illustrate the growth of the Marconi service in the various parts of the world. The latest developments in connection with the technical side of the system will also be covered. The subscription price is fixed at three shillings per annum.

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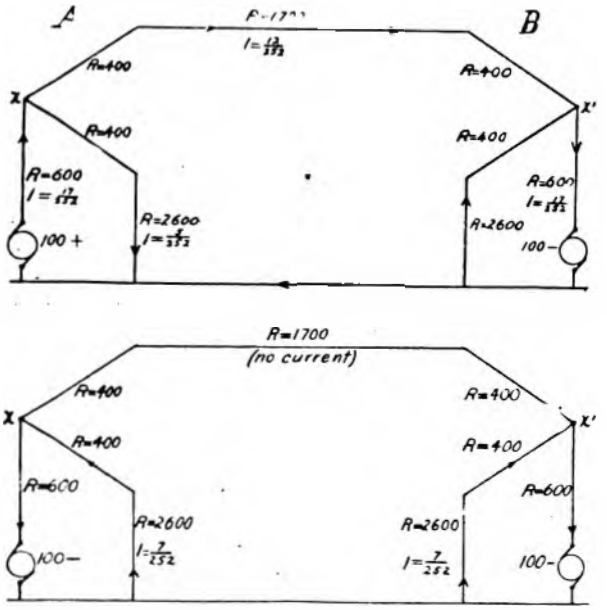
Current Flow in Quadruplex Circuits.

BY W. J. DOHERTY, OF MILES CITY, MONT.

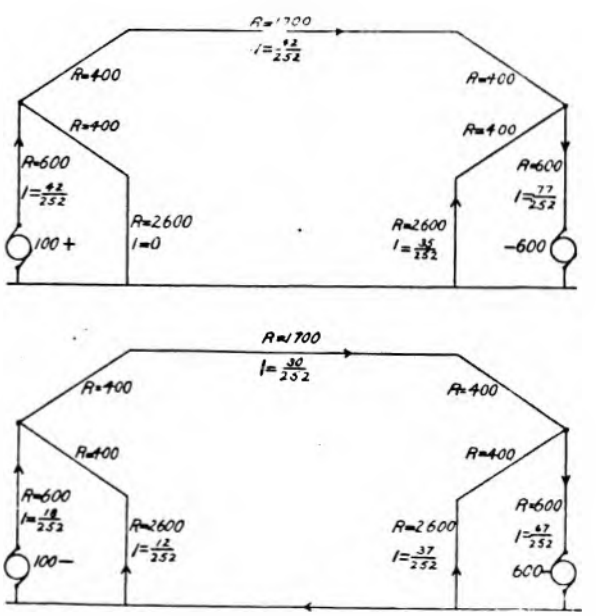
With reference to the operation of duplex and quadruplex circuits there is an interesting feature that I have never seen referred to, and is perhaps understood by very few, besides those familiar with the laws governing current distribution in divided circuits.

Do the currents from the home and distant batteries divide equally between the main and artificial lines, in a perfectly balanced quadruplex or duplex set? The general belief is that they do, but it can be proved mathematically that such is not the case.

It might be well to first explain just what constitutes a perfect resistance-balanced quadruplex



FIGS. 1 AND 2.—DIAGRAMS OF CURRENT FLOW.



FIGS. 3 AND 4.—DIAGRAMS OF CURRENT FLOW.

or duplex set. In Fig. 1 it will be noted that the e. m. f. at Station A dropping to whatever potential it may, at the point of diversion to the main and equating circuits, finds those paths of equal resistance, with 3000 ohms in the equating circuit, and a similar amount in the external circuit; that is to say, 2500 ohms in the line and relays, plus the joint resistance of the distant lamp and rheostat, 500 ohms. This amount will also equal the correct ground-coil value. We may now proceed with a balance to this ground-coil at station A, and we get a difference of potential between the split and the coil of 71 3/7 volts, with a consequent equal division of current between these paths, of 6/252 of an ampere. This condition should exist to effect a perfect balance, yet, strange at it may seem, it does not exist at all when the distant station comes in with battery.

The recorded current values shows (in Fig. 1) only 5/252 of an ampere flowing in the equating circuit, and 6/252 of an ampere delivered to the main line by the home battery. The other 6/252 is, of course, produced by the distant battery.

Whether such a circut is or is not in balance can be proven only by a magnetic test, by reversing at station A. If there is no alteration in the volume of effective current we may safely assume that the balance is preserved. The effective current now is the difference between that flowing in the main line path and that flowing in the equating circuit, or 7/252 of an ampere. These currents passing through their respective coils would on the same core have a neutralizing tendency, 5/252-ampere flowing in the artificial path neutralizing 5/252-ampere of the main line's current, leaving an effective current of 7/252 of an ampere. Now upon reversal (see Fig. 2) there is no difference of potential between X and X' and consequently no current. The equating circuit coil alone, therefore, must maintain the magnetic effect of the 7/252 of an ampere existing before the reversal; hence the reversals exert no disturbing effect. We may now open and close our home pole-changer without producing any effect on the pre-existing magnetic conditions. This is the one very strong argument in favor of these so-called common-side balances, where we meet the actual conditions with rheostat paths; on the other hand the ground coil balance, to say, a standard 600-ohm coil, cannot result in anything else but an approximate discrepancy of 100 ohms in each case.

To those who do not understand how to obtain the required rheostat resistance to balance a duplex attention is called to a formula covering this matter which appeared in Telegraph Age, June 16, 1908.

The conditions represented in Fig. 3 show that

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no difference of potential exists between the terminals of the equating branch at the home station and consequently there can be no current, and that the working margin must be that found alone in the main line coil, viz.: 42/252 of an ampere. In Fig. 4 it is shown that the working margin on reversal consists of this value plus 12/252 in the artificial line plus 30/252 in the main line, the current flowing through the main line coil in the same direction as before thus proving the balanced condition.

In Fig. 2 it was shown that with an e. m. f. of 100 volts at the distant station the margin was 7/252 of an ampere, whereas, in Fig. 4 it is six times as great, thus proving that the working margin is directly proportional to the voltage of the distant battery. In this case it is particularly noticeable that the increase of the distant e. m. f. to 600 volts has not increased the margin at the distant station, which still remains at 7/252 of an ampere, as shown in Fig. 2.

The working margin at the distant station being the difference between the two opposing currents in the rheostat and main line is, in the case of Fig. 2, 7/252 of an ampere. In the case represented in Fig. 3 it is the same, i. e., 42/252 — 35/252 = 7/252, and on reversal, as shown in Fig. 4, the margin remains unchanged, i. e., 37/252 — 30/252 = 7/252, thus indicating that increasing the distant e. m. f. does not increase the margin at that station. Neither does an increase in the home battery increase the home margin.

Interference of Telegraph Lines Supplied by Current from One Generator.

BY JOHN A. ESSLINGER, WASHINGTON, D. C.

One of the leased wires running into the Washington office of The Associated Press has for years been the cause of much annoyance to the operators on account of induction, soc-called. When the circuit stood closed a current of about twenty-five milliamperes was indicated, enough to operate the line under normal conditions. It was necessary, however, to get a close relay adjustment. If the armature was pulled back a trifle too far the relay would chatter at the opening of the most distant key; if not pulled back far enough, it would act so erratically as to make receiving difficult. Intermediate points came "light" in direct proportion to their distance; yet frequently the Washington office would lose letters that reached other points, the wire being free from interruptions.

By inserting a telephone receiver a veritable storm of counter currents was heard. Many of the signals could be read without difficulty and others required close attention; some were on the back stroke and some on the forward stroke; and there were impulses that could not be read at all. But through it all the rhythmical hum of the generator could be distinctly heard.

When the loop was divided and the receiver connected in series with the line thence to ground, a practically clear wire was indicated, while with the battery end of the loop connected through a condenser in series with the receiver to the ground, the same tumult of signals existed. It was discovered that by connecting a relay in circuit with the line and receiver that the disturbances were considerably reduced when the relay was next to the battery, but increased when the relay was connected to the line side; while a choke coil almost entirely eliminated the "induction," in the first position and aggravated it in the second.

The conclusion reached is that with the opening and closing of the various circuits fed from the one generator the circuits discharged their static charges into the multiple lines at the point of connection with the generator in inverse proportion to the resistance of the circuits, consequently, the Associated Press circuit would receive a static discharge either increasing or diminishing the current flowing at any particular moment. Tests on other circuits indicated that this was the real cause of the disturbance, thus leading to the conclusion that induction is not always the cause of these troubles but that they are due rather to too many wires being connected in multiple to the generator, and that the static discharges from the various lines distribute themselves among the wires closed at the moment. The choke coil has the effect of reducing the disturbances very materially.

The Morse Farewell Reception.

At the dinner of the Morse Electric Club which was held at the Savoy Hotel, New York, April 6, President J. B. Van Every asked if any gentlemen were present who attended the Morse farewell reception at the Academy of Music in 1871 to stand up. Only eight answered to the summons. They were: Mr. J. B. Van Every, Mr. A. R. Brewer, Mr. William Holmes, Mr. W. J. Dealy, Mr. E. P. Griffith, Mr. P. J. Casey, Mr. M. H. Kerner and Mr. T. M. Brennan. When it is remembered how large a throng met at the Academy of Music on that occasion to honor the inventor of the telegraph, the few who responded to the invitation to stand up, a mere handful in comparison, reflected the relentless work of time in "decimating the ranks." The thought was impressive to most of those present at the dinner.

Reorganizing the Western Union.—The *Boston Evening Transcript* of April 15 prints a full-page article by H. A. Bullock under the heading "Reorganizing the Western Union." It is a well-written history of the coalition of the Western Union Telegraph Company and the American Telephone and Telegraph Company and traces the progress step by step of the combination from the conception of the idea in the brain of Mr. Theo. N. Vail up to the present time. It is an excellent exposition of the whole subject.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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May 1, 1911.

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

Promotion.

It has been suggested to us that the telegraph companies might adopt some method for the promotion of faithful and competent employes so that the latter could look forward to advancement if they possessed the necessary qualifications. The point is made that one company has shown a liberal spirit in dealing with its employes, with highly satisfactory results, and the question is asked why other companies do not adopt the same policy.

There is no question that it pays any company to look after the interests of its employes and make them satisfied as far as possible. This principle is becoming more and more recognized and, happily, put into practice. There is a decided tendency among the telegraph and telephone companies to better the conditions of their employes. By this it does not necessarily mean that a mere increase in salary alone is the cure-all. The tendency is rather to bring about the results through education and self-help and this is by far the most satisfactory method. It is no more than right and just that an employe should be paid all he is worth to the employing company, but on the other hand the employe is under the obligation to make himself as valuable to his company as possible. Through study and observation he is really bettering his condition; financial results may not be shown at once, but when the opportunity does come to step into a higher position he is fitted to occupy it.

If all the capable men were stationed at one point where they could be drawn from as needed to fill positions each individual would in time probably receive proper recognition, but one difficulty is that they are not so arranged. Many are found in out-of-way places and it is difficult for their light to so shine as to be seen at headquarters, and their talents tend to become unproductive in consequence. These men in many cases so unfortunately situated are largely victims of circumstances but the companies could with advantage keep an eye on them so that they could be called upon to fill more important duties as necessities arise. It is said that the French government keeps an accurate record of every horse in France so that in case of war it knows exactly where it can get its supply of horses. In the army and navy of this country and other countries the government knows the location of every man in the service so that he can be called upon at a moment's notice in case of emergency. The same principle could be applied to the operation of large telegraph, telephone and other companies where the employes are scattered over a large territory. In this way each employe would stand upon the records at headquarters at his true value, and his reward would come sooner or later.

These are days of competition and the man who does not keep up with the spirit of the times must fall behind. If he has not the ambition, then no one is to blame but himself for his failure to move forward. The worthy man can not always be overlooked; if he has the right kind of material in his make-up he is sure to be found out. A man must prove himself to be what he claims to be in order to gain acceptance; if he does not measure up to the standard he is rejected. Many who fail ascribe their failure to favoritism in one form or another, whereas the probabilities are that it is due to their own deficiencies. Failures are due largely to influences within ourselves and not to external influences. It has been given to man to have dominion over all things, but in order to obtain this dominion man must work.

The Busy Man's Creed.

The following creed, promulgated by Mr. Elbert Hubbard, is good enough for the man who is not busy, as well as for the busy man, and should be made the rule of life of every man.

"I believe in the stuff I am handing out, in the firm I am working for, and in my ability to get

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results. I believe that honest stuff can be passed out to honest men by honest methods. I believe in working, not weeping; in boosting, not knocking; and in the pleasure of my job. I believe that a man gets what he goes after, that one deed done today is worth two deeds tomorrow, and that no man is down and out until he has lost faith in himself. I believe in today and the work I am doing, in tomorrow and the work I hope to do, and in the sure reward which the future holds. I believe in courtesy, in kindness, in generosity, in good cheer, in friendship and in honest competition. I believe there is something doing, somewhere, for every man ready to do it. I believe I'm ready—right now!"

Public Control of Public Utilities.*

Public control or regulation of public service corporations by permanent commissions, has come and come to stay. Control or regulation exercised through such a body has many advantages over that exercised through regular legislative bodies or committees. The permanent commission will be a quasi-judicial body. It should be made up of members whose duty it will be, and who will have the desire, the time and the opportunity, to familiarize themselves with the questions coming before them. It should act only after thorough investigation and be governed by the equities of each case. It would in time establish a course of practice and precedent for the guidance of all concerned.

Experience also has demonstrated that this "supervision" should stop at "control" and "regulation" and not "manage," "operate" nor dictate what the management or operation should be beyond the requirements of the greatest efficiency and economy.

Management or operation requires intimate knowledge and experience which can only be gained by continuous, active and practical participation in actual working, while control or regulation can be intelligently exercised, after judicial hearing, by those who have not the knowledge or experience to operate.

Such "control" and "regulation" can and should stop all abuses of capitalization, of extortion or of overcharges, of unreasonable division of profits.

If there is to be state control and regulation, there should also be state protection—protection to a corporation striving to serve the whole community (some part of whose service must necessarily be unprofitable), from aggressive competition which covers only that part which is profitable.

Governmental control should protect the investor as well as the public. It should ensure to the public good service and fair rates. It should also ensure fair returns to the investor.

A public utility giving good service at fair rates should not be subject to competition at unfair rates.

Through a wise and judicious state control and regulation all the advantages without any of the disadvantages of state ownership can be secured, and state ownership doomed.

State control or regulation, to be effective should, when exercised, be accepted and acquiesced in by the public. If all the decisions not in exact accord with the desire or contention of the public are condemned, if it is expected and required that all decisions be against the utilities controlled, if politics and political effect are to govern decisions, if decisions go for nothing with, and are not respected by the public, failure and disappointment are bound to follow, self-respecting men will refuse to act, the standard of appointments will fall and state control and regulation will become a disgrace, and the evils which it was intended to correct will multiply.

If any company gives good service, meets all the reasonable demands of the public, does not earn more than sufficient to provide for the maintenance of its plant up to the latest standard and for reconstruction of plant when worn out or obsolete, pays only fair dividends to its shareholders —if a company is only doing this its rates and charges to the public cannot be unreasonable.

*From the annual report of President Theo. N. Vail of the American Telephone and Telegraph Company.

New Books.

"Telegraphy," by T. E. Herbert, has been revised and brought up to date. This volume gives a detailed exposition of the telegraph system of the British Post Office, and while the apparatus shown is of English design, there is much other matter of value to the American telegraph engineer. The subject of telegraphy is very completely covered in the twenty-two chapters of the book, and the descriptive matter is so clearly written that the student should have no difficulty in grasping and absorbing the ideas and information given.

An idea of the scope of the book may be gained from some of the chapter headings, viz.: Fundamental principles; primary cells; calculations in connection with circuits and conductors; galvanometers, resistance coils and shunts; battery testing; single current systems and relays; duplex; quadruplex; repeaters; different systems of telegraphy; construction of aerial lines; construction of underground lines, etc. The appendix includes a complete description of the Murray automatic system. The book has 912 pages and a very complete index to its contents. Price $3.00. Address J. B. Taltavall, publisher, 253 Broadway, New York.

Rate Regulation in Florida.—A bill has been introduced in the Florida legislature relative to the service and charges of telegraph and telephone companies in that state and conferring jurisdiction over such companies upon the railroad commission.

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The Military Telegrapher in the Civil War.

PART LVII.

On April 28 was unveiled the memorial bronze tablet placed in the Soldiers and Sailors Memorial Hall at Pittsburg, Pa., to commemorate the fiftieth anniversary of the founding of the Military Telegraph Corps of the United States Army. Only sixteen out of the original forty-one volunteers from that county are still alive, among them being Mr. Charles William Jaques, of Ashtabula, Ohio. Mr. Jaques was one of the first to volunteer his services at the outbreak of the war and was stationed at Alexandria, Va. He was operator at Fairfax Court House during the battle of Bull Run, and was associated with the late Jesse H. Bunnell in the constant changing about of the scenes of military operations. Mr. Jaques was cipher operator for General Burnside during the latter's march upon Knoxville and was stationed in that city during the siege. In April, 1864, Captain J. C. Van Duzer added a third wire to the line between Chattanooga and Nashville and Mr. Jaques became a member of the operating staff. Continuing his narrative from that point in his experience, Mr. Jaques says:

"I reported to Captain Van Duzer at Nashville about the time General Sherman with his personal staff left for Chattanooga. I was set to work as cipher operator at the headquarters of the Adjutant General's department in Nashville. After a few weeks' work in Nashville I applied to Captain Van Duzer for a place in the field and reported to him at Chattanooga. As soon as our troops had advanced beyond Dalton, Ga., I was sent with Mr. L. B. Spellman to open an office there. While I was there a terrible railroad accident occurred. The water tank, where the engines took their supply of water, was about a mile north of Dalton and up a heavy grade. It was the custom to cut the engines loose from the trains and go to the tank for water returning to Dalton. A train of several cars loaded with wounded soldiers arrived at Dalton. The engineer cut his engine loose and started for the water tank, although he knew that an engine of another train then at Dalton had also gone up the hill for water. When near the tank he met the other engine coming back and, being afraid of a collision he reversed his engine and both he and the fireman jumped off. The two engines came together but did no damage to themselves. The shock, however, started one of the engines down hill and it ran the distance of about a mile constantly gaining in speed until, when it reached Dalton, it plunged into the train loaded with the wounded soldiers. The tank of the engine went nearly half way through the first car and the platforms of the cars were all crushed and the cars themselves so jammed together that the soldiers could not get out through the doors. Many of them jumped out of the windows. I shall never forget the horror of the situation as I saw the engine plunge into this train of helpless persons.

"After spending a few days in Dalton I was sent to the headquarters of General McPherson, commanding the Army of the Tennessee, to relieve Mr. William B. Somerville who was in poor health. I found this to be one of the pleasantest headquarters I had been in during my entire service in the war. General McPherson seemed to realize that an operator was of some consequence and entitled to some consideration. I was furnished with a good horse and sleeping tent and taken into the mess of Adjutant-General Clark and made to feel much at home from the very beginning.

"The Army of the Tennessee was used so much for flanking purposes, changing from right to left and back again that during the Atlanta campaign we seldom remained long enough in any one place to open a telegraph office. The first and only office we had between Chattanooga and Atlanta was at Kenesaw Mountain where we remained for some time. Over this line was arranged the plan of flanking the enemy. This plan was completed one evening while General McPherson spent several hours in the office. Little did either of us think that before we should open another office General McPherson would be numbered with the dead. We all wished that he had been spared a few months longer to see the end of the war for which he had done so much to make successful, and share with his wife who was waiting so patiently for the end of the war to come, the happiness each had looked forward to for so long. As one of his humble friends, I pay a tribute of respect to his memory. He was one of the bravest and ablest and one of the most unassuming of all the officers in the service.

"After this nothing of any particular moment occurred until after the capture of Atlanta. I was taken sick there just as our troops were starting for Savannah and returned to Nashville. I served there for a short time as cipher operator and then left the service for good."

The Turin Telegraph Tournament.—The international telegraph contest which is to be held on the occasion of the International Exhibition of Work and Industry at Turin, Italy, during the coming summer will begin August 22. The competition will comprise trials with Morse, Hughes and Baudot apparatus and is open to employes of the telegraph service of states adhering to the International Telegraph Convention and also to the staff of submarine cable companies and large private telegraph systems. Those desiring to take part in the competition should apply to the Minister of Posts and Telegraphs at Rome, not later than June 15. Prizes will be awarded to individuals competing in each system. There will also be a single championship prize and a single team prize. There will be ten Morse prizes, eight Hughes and eight Baudot.

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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.]

(37) Q. Will you please tell me what are the relative conductivities of copper and aluminum wires, also their relative weights? B.

A. Taking the conductivity of a given copper wire as unity the conductivity of an aluminum wire of the same gauge will be from .54 to .63, according to the purity of the metal. If the weight of a copper wire of a certain length is one pound, the weight of an aluminum wire of the same length and gauge will be .33 pound.

(38) Q. Is there a simple rule for converting temperature measurements from Fahrenheit to Centigrade and vice versa? If there is, will you kindly state it? J. A. T.

A. The freezing point of the Fahrenheit scale (32°) is equivalent to zero on the Centigrade thermometer, and the ratio between the two scales is 1 to 1.8—that is to say, for every degree of change on the Centigrade scale there is a corresponding variation of 1.8 degrees on the Fahrenheit scale. From these facts we deduce the following rule: To convert Centigrade to Fahrenheit multiply the number of degrees Centigrade by 1.8 and add the product to 32. The sum will be the equivalent temperature on the Fahrenheit scale. Conversely, to change from Fahrenheit to Centigrade, deduct 32 from the given temperature and divide the remainder by 1.8, the quotient will be the equivalent temperature Centigrade. An example will perhaps make the matter clearer. Change 20° C. to the Fahrenheit scale:

$$(20 \times 1.8) + 32 = 68° \text{ F.}$$

Change 68° F. to Centigrade:

$$\frac{68 - 32}{1.8} = 20° \text{ C.}$$

It is only necessary to remember that one degree on the Centigrade scale is equivalent to 1.8 degrees on the Fahrenheit scale. Starting from this relation as a basis a conversion table can easily be constructed.

(39) Q. Does it make any difference, as far as the heating effects of a current are concerned, whether a wire is laid horizontally or vertically? B. L.

A. Yes; with a given current the heating of the conductor will be less when the wire is laid horizontally than when it is suspended vertically.

(40) Q. Our head battery-man, who keeps his battery in first class condition, is constantly complaining of the neglect of the battery-man at another point on the line to keep up his battery to the standard. Our man claims that his battery is being weakened unduly by having to do a portion of the work that the other battery should do, and the two men are at loggerheads over the matter. Will you please give some information on the subject? D. J. W.

A. Your battery man has just cause for complaint. His battery must certainly do the greater part of the work on the line, and consequently is exhausted quicker than it would be if the other battery was doing its proportionate share. It is an easy matter to keep a battery up to the standard of output. A cheap and well-made milammeter can now be obtained for about $5. With this the battery can be tested for output by connecting the milammeter to the two terminals of the battery. If the reading does not come up to the standard, the individual cells can similarly be tested until the defective cell is found. This is an excellent way to keep tab on the battery's performance.

"Looking Backward at Portland," is the title of an interesting book of 100 pages written by Mr. J. W. Hayes, a well-known old-time telegrapher of Portland, Ore. It consists of humorous and interesting stories of the old timers of Portland, of the early eighties, and includes some historical data. In the sketch entitled "A Traveling Auditor" incidental reference is made to several well known old-time telegraph and telephone men. The stories are written in a sprightly and entertaining manner, and make good reading to while away spare moments. The book is well illustrated, the frontispiece showing a picture of the author seated at a typewriter, with his little daughter standing by his side watching the operation of the machine. Mr. Hayes has been totally blind for many years but evidently conducts his business as well as if he were in possession of sight. Copies of the volume which is bound in a substantial paper cover can be obtained at the office of Telegraph and Telephone Age, New York, at $1 per copy.

American District Telegraph of New Jersey.—The report of the American District Telegraph Company of New Jersey for the year ending December 31, 1910, shows the following results as compared with the previous year.

	1910	1909
Earnings	$3,894,578	$3,638,928
Expenses	3,090,832	2,756,779
Profits	803,746	882,149
Dividends	398,549	398,496
Surplus	405,197	483,653
Previous surplus	2,116,390	1,632,737
Profit and loss, adjust. debit	40,160	.....
Profit and loss, surplus	2,481,427	2,116,390

Mr. E. C. Dodge, instructor of the Western Union Electric Club, at Chicago, is wide awake and is making strong efforts to keep his students interested and enthusiastic in their work. In a recent circular distributed among the members of the class he makes some very forcible and convincing suggestions calculated to encourage his students and sustain them in their studies.

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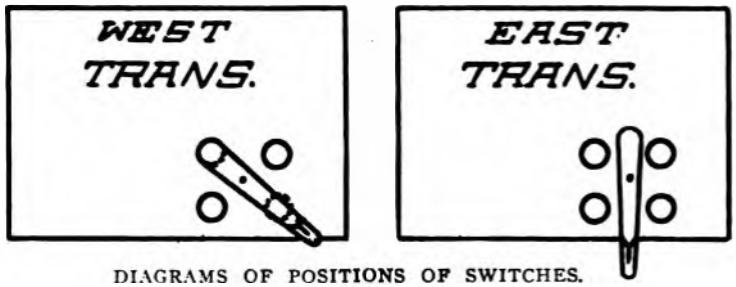
Testing Repeater Points.

A quick method of testing the main line points on a Weiny repeater without disturbing the operation of the repeater has been devised by Mr. J. B. Slocum, night chief operator of the Postal Telegraph-Cable Company, Buffalo, N. Y.

The method is described and illustrated in *The Postal Telegraph* as follows:



DIAGRAMS OF POSITIONS OF SWITCHES.

When the East is sending and it is desired to know how the signals are passing through, the switches are thrown as indicated in the diagrams.

When the switches are placed as indicated the East signals repeater through to the West line and also operate the West relay, which in turn actuates its transmitter as a sounder. The East sender is not interfered with because the East line points in the West transmitter are short circuited by the switch.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER LII.

What is the "Decade" Wheatstone bridge?

What were the conditions which gave rise to the development of the "Decade" testing set?

Name the component parts of the "Decade" testing set.

Describe the construction of the D'Arsonval galvanometer.

Why is the pointer of this instrument "dead beat?"

What causes the pointer to oscillate?

What form of shunt is used in connection with the galvanometer?

In what respect does the shunt differ from the old-style shunt?

What is the principal advantage derived by the use of the universal shunt?

What are the connections for insulation tests?

What is the galvanometer constant?

How is the constant obtained?

To what class of tests is the "Decade" outfit particularly adapted?

What particular kind of test is used for underground cables?

How is a test made to locate a ground in a conductor in an underground cable?

Describe the "R" test.

What is the purpose of the "R" test as described?

What is the principal object sought in making tests for faults in conductors?

What is the rule for ascertaining the distance in feet of a fault?

In making tests, where leads are used, why is it necessary to know the resistance of the leads?

Describe the connections of the direct polar-relay repeater of the Postal Telegraph-Cable Company.

Describe the construction of the Western Union Telegraph Company's standard lightning arrester, fuse and holder.

Describe the new type of switchboard referred to at the end of Chapter LII.

In designing this board what was the object sought?

What are the advantages of this board?

[This concludes the chapters in Jones' Diagrams. In our next issue we will take up Maver and Davis' "Quadruplex" and treat it in the same manner.]

Emergency Resistance in Testing.

When measuring currents with an ammeter, in the field, it not infrequently happens, says Mr. F. H. Kingsley, in *The Signal Engineer*, that the highest scale reading is not sufficiently large to permit the measuring of the current in question. If the needle is thrown over beyond the end of the ammeter scale, under these conditions, it is still possible to obtain an intelligible reading as follows: Shunt the ammeter terminals, while in the circuit, with a resistance, varying this resistance until a scale reading is obtained. Any number of readings may then be taken with the resistance remaining as thus determined. After completing the test, care should be taken not to disturb the emergency shunt. At the home station, the readings of the ammeter used for the field test, still equipped with its emergency shunt, may be compared with a standard instrument of proper range. Then, by means of direct proportion, the correct values of the field readings may be accurately calculated.

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Interesting Subjects Treated in Back Numbers.

Telegraph and Telephone Age publishes the best articles which can be obtained anywhere upon telegraphic subjects. We enumerate herewith a few of the many important subjects treated in our columns during the past few years, together with the dates of the papers containing the same. We have a limited supply of the back numbers containing these articles which we will send to any address upon receipt of price, 25 cents each. Any of these issues less than six months old are not regarded as back numbers, but will be sent upon receipt of the regular price, 10 cents. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Anniversary Number, Twenty-fifth Year, Containing Full-Page Engravings of Officials and History of Various Telegraph Companies.....Jan. 1, 1908

Automatic Telegraph Systems:
Phillips' Automatic System.....Aug. 16, 1900
Wheatstone Transmitter, C. C. Vyle and E. V. Smart.Aug. 1, 1908

Batteries:
Dry, U. J. Fry.....**Aug. 1, 1908**
Storage, in Signal Service, H. M. Beck.....**Oct. 16, 1908**

Cables:
Atlantic, of 1858, Wm. Maver, Jr.....**Oct. 16, 1908**
Commercial Company, G. G. Ward.....**Jan. 1, 1909**
Semi-Centennial of First Atlantic.....**April 16, 1908**
Submarine Repeater.....April 1, 1909
Information Concerning, by W. H. Jones..Mar. 16, April 1, 1907

Call Circuits:
Arrangement of, J. F. Skirrow.....**Feb. 1, 1909**

Condensers:
The Condenser, W. H. Jones.....**June 1-16, July 1, 1909**

Directory:
Complete List of All Telegraphic Officials.....Jan. 1, 1911

Duplex Telegraphy:
Central Battery, C. C. Vyle and E. V. Smart.....**June 1, 1909**
Common Battery, C. E. Hay.....**Dec. 1, 1908**
Study of Circuit.....**Oct. 16, 1908**

Fire-Alarm Telegraphs:
History of.....**Aug. 16, 1906**
Progress of, J. W. Stover.....**Jan. 1, 1903**

Induction:
How to Neutralize Effects, W. H. Jones.....**April 1, 1908**
Disturbances Due to, J. B. Taylor.....**July 16, 1907**

Instruments, Electrical:
Don'ts for Users of.....**Mar. 1, 1908**

Invention:
Of the Telegraph, F. W. Jones.....**Jan. 1, 1907**

Line Construction:
Rules for, Postal.....**April 1-16, May 1-16, 1904**
Specification of Am. Tel. & Tel. Co.....**Feb. 16, Mar. 1-16, 1904**
Storms and.....**May 16, 1909**

Perforators:
Creed Receiving.....**July 1, 1907**

Poles:
Experiments with Concrete, G. A. Cellar.....**July 1, 1907**
Preservative Treatment by Open Tank Process.....**Jan. 1 1908**

Printing Telegraph Systems:
Buckingham.....**Sept. 1, 1902**
Burry.....**April 1, 1903**
Creed.....**Nov. 16, 1908**
Murray.....**Sept. 16, 1906**
Rowland.....**Sept. 16, 1903, May 1, 1907**
Rowland, Discussion of.....**May 16, 1907**
Hughes Printing Telegraph System.....May 1, 1910
Mercadier Printing Telegraph System.....Jan. 16, 1910
Barclay Printing Telegraph System, June 16, 1908, Mar. 1, 1909, inc. (Pamphlet of same price 50c.)
Dr. G. A. Cardwell's Typo-Telegraph.....June 1, 1905
J. E. Wright Printing System.....May 16, 1910
Baudot Printing Telegraph System.....June 1, 1910

Quadruplex Telegraphy:
A New Apparatus, W. H. Jones.....**Mar. 16, 1909**
With Smith Neutral Relay, J. F. Skirrow.....**Jan. 1, 1909**
The New Western Union Quadruplex System, Wm. Finn, Nov. 1, 1910
The New Western Union Quadruplex System, More in detail, W. E. Athearn, Jan. 16, Feb. 1-16, 1911
The S. D. Field Quadrulpex System.....Dec. 16, 1910
Story of Systems.....**Jan. 1, 1903**

Rectifiers:
Chemical, W. H. Jones.....**Sept. 16, 1908**
How to Make Chemical, G. P. French.....**Mar. 1, 1909**
Mechanical.....**April 16, 1909**
Mercury Vapor, W. H. Jones.....**Sept. 1, 1908**

Relays:
Polar, Construction of, W. H. Jones.....**May 1, 1908**
Polar, Self-Polarizing Quadruplex, W. H. Jones.....**May 16, 1908**

Repeaters:
Atkinson.....**Feb. 16, 1902**
Elementary Lessons on, W. H. Jones.Nov. 1, 1908, to Jan. 1, 1909
Half-Milliken.....**Feb. 16, 1902**
Horton.....**Mar. 1, 1902**
Defective Loop.....**Mar. 1, 1902**
Milliken.....**Jan. 16, 1902**
Neilson.....**Feb. 1, 1902**
Simple Half Set, J. B. Dillon.....**April 16, 1909**
Weiny, Half Set.....**Oct. 1, 1908**
Weiny Phillips.....**Feb. 1, 1902**
Wood Double Loop.....**Mar. 16, 1903**

Stenc-Telegraphy:
The Polyglot Stenocode, A. C. Baremie.....**May 1, 1908**

Switchboards:
Way Station, J. H. Gingrich.....**Dec. 16, 1908**

Telegraph Engineering:
A Study of.....**Nov. 1-16, 1908**

Telegraph Systems:
Dean Rapid.....**Aug. 16, 1907**
Of the Future, W. J. White.....**Feb. 16, 1907**
Phantoplex.....**Oct. 1, 1905**
Santoplex, W. H. Jones.....**Sept. 1, 1905**

Telegraphy and Telephony:
Composite System, E. R. Cunningham.....**July 16, 1908**
Italian Composite.....**Nov. 16, 1908**
Rath Composite System.....**May 1, 1908**

Telephone:
Construction, J. C. Kelsey.....**July 1, 1909**
Despatching Trains by, W. W. Ryder.....**June 16, 1909**
The Telephone, W. H. Jones.....**April 1-16, May 1-16, 1909**
For Train Despatching, W. E. Harkness.April 1-16, May 1-16, 1909

Testing:
By Voltmeter and Ammeter, F. W. Jones.....**Nov. 1, 1906**
Insulation by Milliammeter.....**May 16, 1908**
Murray Loop Method, W. H. Jones.....**Jan. 16, 1909**
Use of Wheatstone Bridge, J. P. Edwards.....**May 16, 1909**
Varley Loop Method, W. H. Jones.....**Aug. 1, 1907**

Tickers:
Scott-Phelps-Barclay-Page Self-Winding.....**Oct. 1, 1905**

Undergrounds:
English System.....**June 1-16, July 1-16, 1909**
Underground Lines.....**April 1, 1909**

Wire Chief:
How to Become One, W. H. Jones....**Jan. 1-16, Feb. 1-16, 1908**

Wireless Telegraphy:
Commercial Application of, G. Marconi.....**Mar. 16, 1908**
Communication Over Sea by, J. E. Murray.....**April 1, 1908**
Early History of, J. E. Taylor.....**June 1, 1909**
In American Republics.....**May 1, 1909**
Signaling Through Space, C. D. Babcock.....**Jan. 1, 1909**

Directory of Annual Meetings.

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

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

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

International Association of Municipal Electricians meets at St. Paul, Minn., September 12, 13, 14 and 15, 1911.

Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, will meet at Atlantic City, N. J., September 5, 6 and 7, 1911.

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

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

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

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

Telegraphers and telephonists should make a study of their professions. They can do this without loss of time by studying books on telegraphy and telephony. Telegraph and Telephone Age, 253 Broadway, New York, is headquarters for all electrical books published.

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Damage to Poles by Woodpeckers.

BY C. T. DAY, SUPERINTENDENT OF TELEGRAPH SOUTHERN PACIFIC RAILWAY IN MEXICO, EMPALME, MEXICO.

In our issue of December 16, 1910, we printed an article from Mr. C. T. Day, superintendent of telegraph of the Southern Pacific Railway in Mexico, Empalme, Mexico, in which he gave a brief account of the damage to poles on the lines of his company by woodpeckers. Mr. Day has sent us several photographs of poles damaged in this way, which show that the birds are very thorough in their work and leave nothing to be desired in the number and size of holes.

The two views shown herewith are typical. That of the pole reveals the effects of the woodpeckers' work. The pole is certainly well ventilated.

With the photographs Mr. Day sends us some additional facts regarding the pole situation in that country, which we print herewith. He says:

"I have just finished reading your interesting articles on the pole situation. It seems to me that our lines here in Mexico have been hit harder by adverse conditions than are lines in the States. To give you some idea of the damage done by woodpeckers to our poles on the Sonora Railway, between Magdalena and Torres, a distance of 229 kilometers (142 miles), I may state that we have

FIG. 1.—PIECE OF A POLE DAMAGED BY WOODPECKERS.

just completed the work of changing 500 poles. Of this number 450 were removed on account of being so weak from holes made by the birds that they were no longer fit for service. Of these poles a number were creosoted, some of them having been set in 1908. Others were redwood, cedar and pine.

"One of the pictures shows a piece of a pole damaged by woodpeckers. One creosoted pole taken down had six holes, starting a foot below the crossarm. The first hole was two and one-half inches wide by eight inches long, the cavity extending five inches into the pole horizontally, and having a vertical depth of one foot. The pole at this point, therefore, was a mere shell. The

FIG. 2.—POLE SHOWING EFFECTS OF WOODPECKER'S WORK.

other holes were slightly smaller and of the same general shape.

"Last spring we began reconstructing with a small gang of men, using a burnettized pole with creosoted butt. It was claimed that these poles would stand any attack the birds might make, but I find that they are attacked as readily as cedar or creosoted pine. The only remedy seems to be to use a concrete pole, which we are figuring on now."

Mr. Frank B. Knight, the well known old-time and military telegrapher and for the past 20 odd years special agent and head of the publicity department of the Southwestern Telegraph and Telephone Company at Dallas, Tex., has always been a reader of this publication. He writes: "Telegraph and Telephone Age is simply fine these days, and I see it everywhere. It evidently enjoys a great circulation and is disseminating a lot of information on all sorts of subjects, which is not only interesting but valuable."

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The Military Telegraph Corps Tablet at Pittsburg.

The accompanying illustration was made from a portrait of the bronze tablet which was unveiled at Soldiers' and Sailors' Memorial Hall, Pittsburg, Pa., April 28. This tablet was erected to commemorate the fiftieth anniversary of the founding of the United States Military Telegraph Corps and in memory of the forty-one volunteers from Allegheny County, Pa., who served in the corps during the civil war. The names of the forty-one men who enlisted, including those who have died and of the survivors, were printed in our issue of April 16.

MILITARY TELEGRAPH CORPS TABLET UNVEILED AT PITTSBURG, PA., APRIL 28, 1911.

The tablet measures nine feet long by four and a half feet high and was designed and modeled by Mr. Charles Keck of New York. Mr. Keck was the pupil and assistant of the late St. Gaudens, the famous sculptor.

The faces set in relief along the border of the tablet will be easily recognized and the artist has performed his task well in reproducing the features of the twenty-eight men thus represented. The names of the remaining thirteen, pictures of whom could not be obtained, are inscribed above and below the inscription.

Following is the inscription on the tablet: "To Commemorate the United States Military Telegraph Corps from Allegheny County, Pennsylvania.

"Washington, D. C., April 22, 1861.

"D. McCargo—Send four of your best operators to Washington at once prepared to enter government service for the war.

"Andrew Carnegie.

"No orders ever had to be given to establish the telegraph. "Grant's Memoirs."

The unveiling exercises took place at 4 p. m., the presentation address being made by Mr. David H. Bates, secretary of the Society of the United States Military Telegraph Corps. Mr. William J. Patterson, president of the Memorial Hall Committee, made the address of acceptance, and this was followed by an address by Mr. Andrew Carnegie, founder of the Corps. Other addresses were made by Mr. Richard O'Brien, of Scranton, Pa., one of the first four operators, and Mr. William R. Plum, of Lombard, Ill., historian of the Corps.

Associated Press Telephone Service.

About thirty papers are now 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. The changes from telegraph to telephone occurred mainly in the Central West and followed the recent action of the Interstate Commerce Commission in assuming control of the telegraph companies, which brought about some increase in rates.

Special instruments are installed in the central office, from which the report is telephoned, and at the receiving end of the wire. Several receiving points are connected, and all get the same service at one sending. The report is copied directly on the typewriter. After a little practice, senders and receivers harmonize their methods and work with a minimum amount of friction and delay.

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Value of Property Used in a Telephone Conversation.—Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, recently gave some interesting figures showing the value of the property placed at the disposal of telephone patrons during conversations over long-distance lines. "You hear a good deal of complaint," he said, "about high charges for long-distance calls. But as conditions have existed in the past we had to charge high. Let the complainer do a little calculating and he will understand. There are about 240 pounds of copper in a mile of wire. At 15 cents a pound this means $72 per mile. Add to this the cost of poles, installation and all that, and we have $122 per mile. When a man in New York calls up Chicago, he has at his disposal about $125,000 of our property. Allowing 6 per cent. interest on that sum, and another 6 per cent. on depreciation, we have an annual cost of about $15,000, or $50 a day. That is a fixed charge, and the tolls must be high enough to leave an appreciable profit. Through contracts which have been made by the American Telephone and Telegraph Company and the Western Union it is now possible for us to use these long-distance telephone wires for telegraph service. One wire will provide four telegraph circuits. In this way it will be possible to increase greatly the earning capacity of the wires and open the way for a reduction in the tolls on long-distance calls."

The Early Days of the Telegraph.

The difficulties that Professor S. F. B. Morse had to overcome in the development of his telegraph were enough to discourage the average man, and many of the objections urged against the adoption of the new invention were amusing in the extreme.

The Baltimore & Ohio Railroad rendered what aid it could to Professor Morse in the development of the telegraph, but a rival road later advanced the idea that the telegraph would interfere with traffic, for if people could speak with each other so quickly they would not care to meet, hence they would not travel. The resolution drawn up by the Baltimore & Ohio Railroad Company agreeing to allow Professor Morse to use its right of way for his telegraph poles contained the amusing proviso that the sending of electric messages shall be allowed if they do not in any way "prove injurious."

The diagrams appearing in "Official Diagrams of the Postal Telegraph-Cable Company's Apparatus and Rules Governing the Construction and Repair of Lines" were made from the company's blueprints and are absolutely correct. This volume, which is published by Telegraph and Telephone Age, under official sanction and supervision, is of especial value to operators and linemen. It will be sent to anyone, postpaid, on receipt of fifty cents. Address J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York.

Signaling System for Quadruplex and Duplex Circuits.

The Western Union Telegraph Company, through the office of Mr. W. E. Athearn, engineer of equipment, New York, has issued specifications for the installation and operation of a signal system to secure prompt attention on quadruplex and duplex circuits. The following extracts and illustrations are taken from the *Journal of the Telegraph*:

In the operation of multiplex telegraph circuits, the best practice is to locate the quadruplex and duplex sets for each city in a selected portion of the main office, where they may be most efficiently cared for by attendants who are specialists in this work. From these sets, local loops or legs extend to the operating tables, which are equipped with simple Morse apparatus consisting of keys and sounders; such operating tables may be located in the operating room of the main office, or at a branch office or subscribers' station in the same city.

When trouble of any kind develops on the circuit, it is necessary that the attention of the quadruplex or duplex attendant be promptly called to it, in order that he may remedy matters by readjustments of the apparatus, or by substituting a good wire for a faulty one. To supersede the present indirect methods of securing attention at such times, a signaling system has been devised which permits an operator who notices trouble on his circuit to immediately call in, by pressing a push button, the attendant at the multiplex set. This lights the signal lamp at the quadruplex or duplex set, whether the key at the operating table is open or closed. If the circuit is still workable, the operators may continue to use it, as the signal lamp will not be extinguished until the attendant answers at the multiplex set. In so answering, the first opening at the attendant's Morse key automatically extinguishes the signal lamp; when the attendant closes his Morse key, the lamp is ready to respond to another call-signal whenever the push-button may be depressed again.

This signaling system depends for its operation upon a small relay, which has an ironclad magnet of about one ohm resistance. For ordinary cases, where loops or legs are connected directly to duplex or half-quadruplex sets, one of these relays is connected in the sending side at the set. This relay is unaffected by the regular working current of about 250 milliamperes, but operates when the current is increased to 350 milliamperes or more. Such an increase of current occurs whenever the signaling push button is depressed at the operating table. This is accomplished, in the case of an office loop, by having the push button make contact between the loop and an auxiliary path to ground of lower resistance than the regular working circuit; at a branch office or subscriber's station a 3-point push button is used instead, and cuts in an additional battery of such voltage and polarity as to similarly increase the current. In responding to the increase of current, the signal relay armature closes the circuit of the signal lamp, and thus locks itself in the closed position, as the current of about 300 milliamperes taken by the

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lamp is obtained through the relay winding and continues to energize the magnet regardless of whether the circuit at the operating table is open or closed. It will therefore be seen that a single depression of the push button at the operating table will cause the signal lamp at the quadruplex or duplex set to become and remain lighted, even though the circuit may continue to be operated and the sending leg thus be opened and closed by the manipulation of the Morse key at the operating table. It is also immaterial whether or not the Morse key at the operating table is closed at the time the push button is depressed. To extinguish the signal lamp, the attendant at the quadruplex or duplex set simply answers by Morse in the usual way; the first opening of his key for this purpose cuts off all current

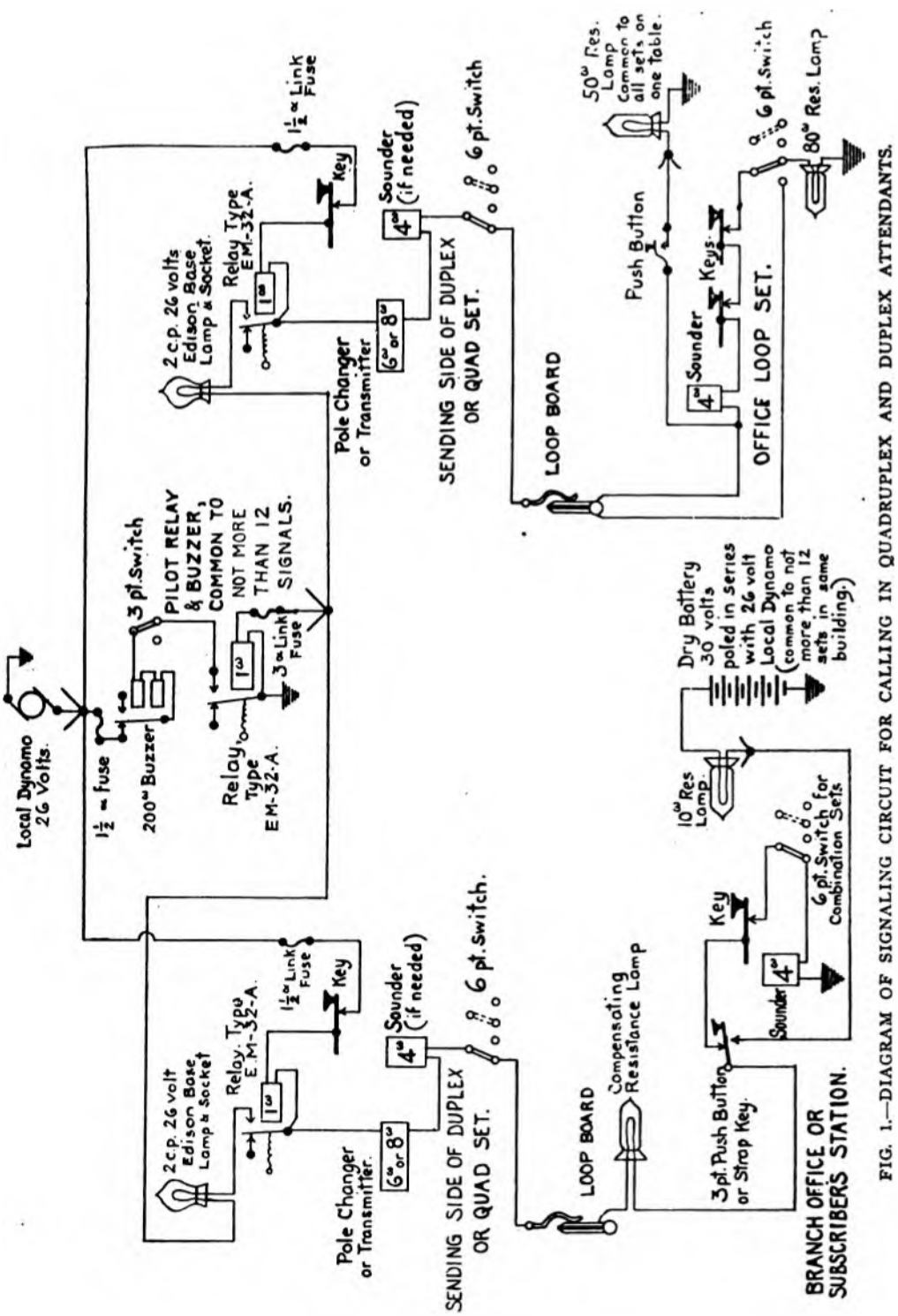

FIG. 1.—DIAGRAM OF SIGNALING CIRCUIT FOR CALLING IN QUADRUPLEX AND DUPLEX ATTENDANTS.

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from the sending side circuit, including the signal relay and lamp, thus causing the relay magnet to release its armature which in turn opens the lamp circuit. In order that the need of attention at a multiplex set may be promptly met, even if the attendants fail to notice the lighting of a signal lamp, a pilot relay is inserted in the ground connection of each group of lamps. This relay is of the same type as the signal relay. When one or more lamps are lighted in the group connected with it, the pilot relay closes a circuit containing a bell or buzzer, thus giving the necessary audible signal. A two or three point switch is provided for opening the buzzer circuit during periods when the number of attendants is such that a lighted signal lamp is certain to attract attention.

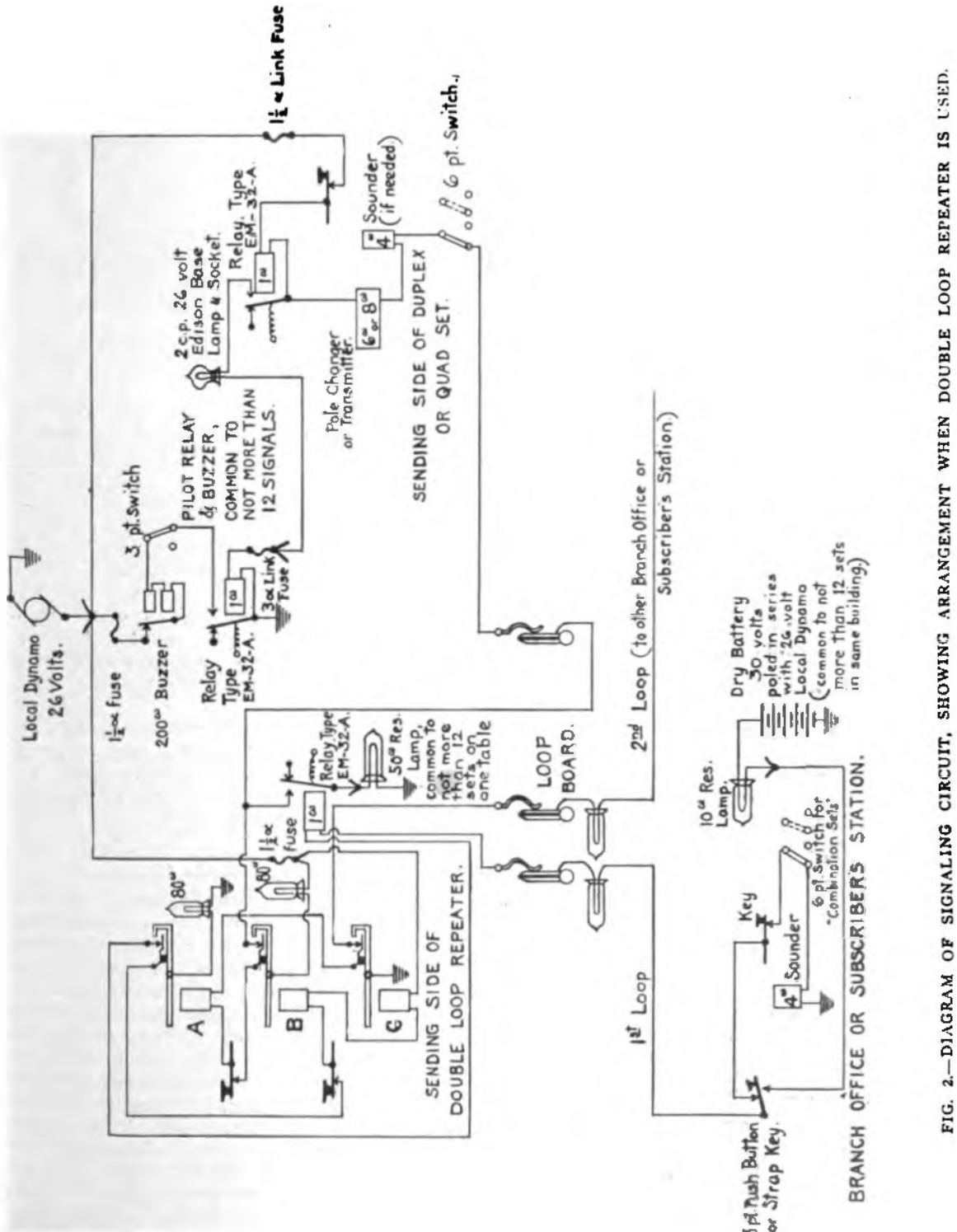

FIG. 2.—DIAGRAM OF SIGNALING CIRCUIT, SHOWING ARRANGEMENT WHEN DOUBLE LOOP REPEATER IS USED.

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For those cases in which the sending and receiving legs are connected to the quadruplex or duplex sets by means of a double loop repeater, a relay is provided at the double loop repeater. The function of this relay is merely to repeat into the sending circuit of the multiplex set, the signals made by the depression of the push button in the sending leg with which connection is made through the double loop repeater. The relay is therefore adjusted so as to follow the operation of the push button, the magnet attracting its armature while the increased current is flowing, and releasing it when the current is reduced to its normal value by the releasing of the push button. The closing of the relay armature reduces the resistance of the sending circuit of the multiplex set in the same way as the operation of the push button at an office loop set, thus setting the signal at the multiplex table. The duplex or quadruplex attendant restores the signal as previously explained, by answering there with his Morse key and is not required to go to the double loop repeater set, since the signal-repeating relay at that set has already restored itself on the release of the push button.

Train Portable Telephone Sets.

With the spread of telephone train dispatching among the railroads the portable telephone set has come into extensive use on such lines. This set is

FIG. 1.—SET EQUIPPED WITH 5-BAR GENERATOR.

being used by officials in their private cars, inspectors, train crews and construction, bridge and wrecking gangs.

FIG. 2.—SET WITH LEATHER CASE, CLOSED.

By the use of these sets communication can be established immediately between a distant point and headquarters connection being made with the telephone train wires by means of a line pole.

The Western Electric Company manufactures

FIG. 3.—SMALL AND LIGHT TALKING SET, IN LEATHER CASE.

three types of portable railway sets. The set shown in Fig 1 is equipped with a powerful 5-bar generator and finished with a special weatherproofed varnish. The construction is of the strongest throughout, and the corners are reinforced with steel. The hand set is attached to a 6-foot cord so that the user may stand upright when the set is on the ground, and a push-button is provided so that the transmitter circuit is closed only when desired. The set shown in Fig. 2 is of similar design, but equipped with a 3-bar generator, and that illustrated in Fig. 3 is for use on train wires where the dispatcher is at all times connected with the circuit; it has no generator.

Many of the roads are equipping every train on their lines with these sets, and their use on wreckers is very general. In some cases, the portable telephone set is made part of the standard equipment of the engine.

Other Trade Notes.

Selective Train Order Signaling.—The United States Electric Company has issued Bulletin No. 701, entitled "Some Preventable Accidents," in which three of the collisions reported in the latest train accident bulletin of the Interstate Commerce Commission are studied and shown to be preventable with apparatus now available to the railways. This company's system provides, in brief, for the absolute control, by the dispatcher, of any semaphore or train-order board which he may throw to the stop position, independent of the presence of local attendance. The signal, when so thrown, reports itself audibly to the dispatcher and cannot be set back in the safety or proceed position until electrical permission so to do has been given by the dispatcher, although the dispatcher may clear the signal without the intervention of the train crew or agent.

Electric Storage Battery Company.—The Electric Storage Battery Company, Philadelphia, Pa.,

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will erect a new reinforced concrete building in that city, approximately 300 feet long, 115 feet wide and six stories high, besides a one-story extension 80 by 120 feet. It will be the largest building of that type in the city. The demand for this company's storage batteries has increased to such an extent that it has been necessary to provide additional manufacturing facilities.

Dinner of English Electrical Engineers.

In an address before the eighth annual dinner of the Post Office engineering department, London, the Hon. Herbert Samuel, postmaster general, referred to the new telephone cable between England and France.

"Certainly," he said, "the new cable has enabled telephonic communication to be made between Paris and Glasgow and conversations have been successfully held, I presume, in a mixed French and Scotch accent between these two places. For myself, I am, of course, a layman in these matters and make no pretensions to any but a layman's knowledge in that respect. I am not quite so ignorant, however, of electrical matters," he continued, "as the man who recently was mentioned to me by Sir John Gavey. He was pursuaded that the way in which faults were discovered in submarine cables was to pump air into them and watch with a telescope to see where the bubbles came up. But any of us who have the ordinary organs of hearing are able to judge—as I myself have been able to judge—by actual test the extraordinary efficiency of the new telephonic cable compared with the old one which maintained communication between our country and France."

Mr. Alexander Siemens, president of the Institution of Civil Engineers, said he was in charge of the work of building telegraph lines in Persia in 1868. The line had to cross a mountain peak and it was laid out in a straight line for 80 miles. Someone afterwards asked "who was the idiot that laid out that line." Mr. Siemens acknowledged that he was the person concerned. The man said "whoever built the line set it up in the middle of the road." This appeared to be true, the explanation being that the caravans followed the telegraph line, some going to one side and some the other, and that was how the poles got in the middle of the road.

Mr. S. Z. de Ferranti, president of the Institution of Electrical Engineers, made some interesting remarks regarding his early work in the utilization of high-voltage currents and made some humorous references to the controversy he had with the post office department in regard to the use of the earth for grounding purposes. The matter was finally adjusted amicably, but on one occasion one of the high tension cables failed between London and Deptford station so that he was compelled to ground both ends of the cable in order to establish a lighting circuit. The result was that telegraph service with the continent was demoralized for the entire night, and in referring to the matter the newspapers next day stated that the trouble was due to an electrical storm.

Among those present at the dinner were Major W. A. J. O'Meara, engineer-in-chief, presiding; Mr. William Marconi; Sir John Gavey, ex-engineer-in-chief; Mr. Alex. Siemens, Mr. S. Z. de Ferranti, Mr. W. Duddell, Dr. Walmsley, Prof. Ewing, Col. Bain and Mr. J. Newlands.

More the Haste Less the Speed.

The story of the five wise and five foolish virgins is brought to mind by the experience of an eminent electrician of the Western Union Telegraph Company who was arrested while riding his bicycle at night without a light. He explained to the policeman that the light had just gone out, but the policeman, being a wise man, and knowing the habit bicycle lights had of extinguishing themselves when a policeman heaves in sight, gathered in the victim in spite of his protestations. He was, to the large crowd which speedily gathered, a hero, but when they learned that it was a case of light out they dispersed in disgust.

Mr. Carnegie who is reputed to be one of the richest men in the world occasionally encounters streaks of ill-luck, despite the general belief that he and others of his ilk have nothing else to do but enjoy themselves. Mr. Carnegie was caught red-handed a few days ago with the goods. The law knows no persons, and dispenses justice and injustice upon all alike, rich and poor. As if Mr. Carnegie had not sufficient notoriety, he succeeded in having himself and his chauffeur arrested recently for violating the automobile speed law. To this humiliation he was compelled to add another in confessing to the court that he did not have such a fabulous sum as $50 about his clothes with which to satisfy the demands of the law for his reckless driving. Mr. Carnegie, after pledging his Fifth Avenue mansion to pay the fine, was permitted to depart and keep an engagement to play a game of golf with some friends.

Following close upon the heels of the Carnegie episode came the announcement that Mr. and Mrs. Clarence H. Mackay had, individually and separately, without malice aforethought, brought themselves into the limelight of public notoriety by speeding their automobiles into the arms of a couple of obscure country guardians of the law yearning for fame. Mrs. Mackay had hardly been released from durance vile when word came of the arrest of her estimable husband for the same offence. Rich men do not speed their automobiles in the race after wealth alone; even they have different motives. Mr. Carnegie's goal was golf and Mr. Mackay's was dinner. Mr. Mackay's automobilistic haste can be explained on the ground that he is a living exponent of haste and speed. He advocates speed in the telegraph business and he is constantly preaching the speed gospel to his subordinates, so it is not surprising that speed has become second nature with him. It is not reported how much money Mr. Mackay had with him, but he got his dinner.

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Insulated Wires and Cables

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

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

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

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The Railroad.

Mr. J. F. Keegan, recently appointed superintendent of the Baltimore & Ohio Railroad at Wheeling, W. Va., was formerly a telegraph operator. His entire business career has been spent in railroad service.

J. C. Dailey, aged 47 years, a leading railroad official in the West, and a former telegrapher, died in Salt Lake City, Utah, April 3. At the time of his death he was general superintendent of the Utah lines of the Denver and Rio Grande Railroad.

Mr. Wm. M. Hayes has been appointed superintendent of telegraph of the Pere Marquette Railroad, with headquarters at Detroit, Mich., to succeed Mr. Theodore Ensel who has been promoted to division superintendent at Grand Rapids. Mr. Hayes was formerly chief clerk to the division superintendent at the latter place. Mr. W. K. Tasker, formerly superintendent of telegraph of this system, is now division superintendent at Detroit.

Telephone Train Dispatching.—Mr. G. K. Heyer of New York, gave a talk on "Telephone Train Dispatching," before the Boston Plant Chapter of the Telephone Employe's Association of New England, on April 28. The lecture was illustrated by lantern slides.

The Boston Convention of Railway Telegraph Superintendents.

The Association of Railway Telegraph Superintendents will meet in annual convention at the Hotel Brunswick, Boston, Mass., June 19-23. The meeting will probably be one of the most important ever held by the association, as the rapid developments in railway telephony, dispatching, etc., are constantly bringing up new problems that require careful consideration at the hands of the association. It will be a busy convention, and several valuable papers are promised and Mr. W. C. Walstrum, of Roanoke, Va., chairman of the committee on topics, is very busy arranging for the papers to be read. The entertainment features have not been overlooked, and elaborate provisions have been made in this respect. Automobile rides, musical entertainments, etc., will be provided. Mr. S. A. D. Forristall, superintendent of telegraph of the Boston & Maine Railroad, Boston, Mass., is chairman of the committee having the business and entertainment programme in charge. One of the important matters to come before the meeting will be the Turner Monument project, and the plans for the monument will be officially passed upon.

Mr. P. W. Drew, Room 306, 135 Adams street, Chicago, is the secretary of the association and will be glad to furnish further information regarding the meeting.

Telephone Train Dispatching.

The Queen & Crescent Railway has completed the construction of a telephone train-dispatching circuit paralleled by a local message telephone circuit on the second district of the Cincinnati, New Orleans & Texas Pacific Railway, which extends from Danville, Ky., to Oakdale, Tenn., 134 miles. There are more than twenty tunnels on the division.

Telephone Train-Dispatching Statistics.—According to the bulletin of the Interstate Commerce Commission, just issued, 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. The telephone figures represent an increase of 15,372 miles for the preceding year.

Atlantic City Meeting of Old Timers.—The Atlantic City meeting of the Old Time Telegraphers and Historical Association and the Society of the United States Military Telegraph Corps, on September 5, 6 and 7, promises to be one of the most enjoyable and largely attended meetings ever held by the twin organizations. Plans for the meeting are being developed and announcement will be made to the members of anything of interest. The headquarters will be at the Marlborough-Blenheim. Col. W. B. Wilson, Holmesburg, Pa., is president of both associations, and Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old Time Telegraphers and Historical Association. Mr. David Homer Bates, 658 Broadway, is secretary of the Society of the United States Military Telegraph Corps. Mr. G. W. Deetz, manager of the Western Union Telegraph Company, Atlantic City, N. J., is a member of the executive committee and has charge of many of the local arrangements.

Electrical Condensers.—Mr. William Marshall, the well known manufacturer of electrical condensers and artificial cables, New York, has just issued a pamphlet describing and illustrating the various kinds of condensers manufactured by him. Apart from the trade description and specifications of these instruments, the pamphlet gives considerable information regarding the theory and construction of condensers in general, also directions for their use. A copy of this pamphlet can be obtained by any one interested by addressing Mr. Marshall at 709 Lexington Ave., New York.

Dr. A. E. Kennelly, professor of Electrical Engineering at Harvard University, and an old-time telegrapher, has accepted an invitation from the University of London to deliver a series of lectures during the latter part of May, on "The Application of Hyperbolic Functions to Electrical Engineering Problems.

Pollak-Virag System of Telegraphy in France.—It is stated that the Pollak-Virag system of telegraphy will be used in France for the purpose of transmitting press matter.

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The Turner Monument Fund.

An opportunity is offered to those who have any ideas on the subject of commemorative monuments to submit sketches for the monument to be erected at Turner, N. Y., to commemorate the sending of the first telegraphic train order which took place in the fall of 1851 and was issued by Charles Minot, general superintendent of the Erie Railroad.

In our issue of January 1 we gave a sketch for the monument which has been submitted to the committee for approval, but so far this is the only design that has been sent in. It is the committee's desire to have other designs to pass upon, and it invites general competition in the work. It should be distinctly understood that the plan already submitted has not been accepted, therefore the way is open for others who may wish to express their ideas of what a monument of this character should be. The competition is not confined to professional monument designers; all are invited to participate in the contest. Frequently better ideas are obtained from laymen than from professionals.

The committee having the matter in charge expects to hold a meeting in the near future to pass upon plans and suggestions which may be submitted to it. A rough sketch embodying the individual ideas will answer in the absence of a more finished drawing. It is hoped that as many as possible will enter the competition with a drawing of some sort, but preferably telegraphic in character.

The fund is steadily growing and now amounts to nearly one-half of the total needed, viz.: $3,000.

The following named gentlemen constitute the committee in charge of the monument fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia. F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

The contributions toward the fund received up to date are as follows:

Previously acknowledged, $1,316. M. J. Carpenter, $1.00; M. W. Wells, $0.50; E. H. Pfafflin, $0.50; H. Knowles, $0.50; F. H. Van Etten, $1.00; J. T. Averitt, $0.25; D. M. Cameron, $0.25; C. T. Young, $0.25, all of Chicago, Ills.; H. P. Radley, $0.50; F. A. Leith, $0.25; E. E. Heller, $0.25; F. W. Cherry, $0.25; W. E. Allen, $0.25; E. C. Sappenfield, $0.25; N. D. Fisher, $0.25; H. E. Fitch, $0.25; C. S. Roof, $0.25; W. H. Powley, $0.25; A. P. Turner, $0.25, all of Terre Haute, Ind.; W. O. Duntley, President Chicago Pneumatic Tool Company, Chicago, Ills., $15.00; G. A. Cellar, Pittsburg, Pa., $5.00; R. H. Wallace, $1.00; J. F. Shinn, $1.00; H. W. Hawley, $1.00; W. O. Rock, $1.00, all of New York; A. C. Hilton, $1.00; J. F. Condon, $1.00, Buffalo, N. Y.; F. S. Howard, Elmira, N. Y., $1.00; R. O. Humphrey, $1.00; W. L. Ferris, $0.50, Passaic, N. J.; H. R. Cole, Arlington, N. J., $1.00; American Brake Shoe & Foundry Company, Mahwah, N. J., $25.00.

Total, $1,377.75.

Death of Fred Catlin.

Fred Catlin, one of the best-known telegraphers ever produced in America, died at his home in East Orange, N. J., on April 14, at the age of 63 years. He was a born expert operator, and was expert not only as a sender, or as a receiver, but both, besides being an expert in penmanship. In addition to these qualifications which brought him wide renown, Mr. Catlin was a man of high character and of pleasing presence. He was always domestic in his habits and for this reason he did not wander around the country, as many other famous operators did. But this did not detract from his fame, which grew to be world wide.

Mr. Catlin was really a phenomenon in the telegraphic world. As a sender his style was adjudged to be most perfect and finished besides being speedy, and as a receiver he was equally skilled, and his penmanship was graceful and beautiful. His style of sending was of such grace and ease that it practically became the American standard, and the Catlin "grip" of the key was the model for operators for a generation.

By reason of his peculiar fitness to give things a finish Mr. Catlin was always selected to carry out special telegraph work, where good judgment and taste were involved. He taught telegraphy to Mr. George J. Gould, and his distinguished pupil speedily became a good operator under his instruction.

Much of Mr. Catlin's fame came from his active management of various tournaments held in New York and vicinity during the past forty years. He managed these events with masterly skill and they always received the enthusiastic support of the profession and met with great success. While his musical Morse sending is forever silenced his extraordinary skill as an operator is reflected in his son Frank L., whose fame as a high-class telegrapher is country wide.

Mr. Catlin was born in Great Bend, Pa., March 26, 1848, and learned telegraphy on the Erie Railroad. He was in the service of the Western Union Telegraph Company in New York for forty-five years.

The funeral took place on April 16 and was attended by many of his former telegraph friends. He is survived by his wife, three daughters and two sons.

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The Telephone.

Mr. D. H. Drewery, commercial manager of the Pacific Telephone & Telegraph Company, Seattle, Wash., has resigned to become general manager of the Kootenai Telephone Lines, Limited, of Cranbrook, B. C.

Mr. Angus S. Hibbard, second vice-president and general manager of the Chicago Telephone Company, has been elected a director of the Chicago Savings Bank and Trust Company. Mr. Hibbard will remove to New York early in May to take a position on the staff of Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, and of the Western Union Telegraph Company.

Telephones in New York Cathedral.—The new Cathedral of St. John the Divine in New York, which was dedicated April 19, is equipped with an extensive telephone system.

Telephones for Rangers.—Rangers in the National forests are to be supplied with portable telephone sets with a special flexible wire which can be easily and quickly run along the ground to isolated places in the forests. The telephones will be of use in summoning help to prevent conflagrations.

The Telephone in Emergency Service.—The Delaware, Lackawanna & Western Railroad, besides being fully equipped for telephone train dispatching has also in service portable test sets for the use of its linemen, with the extension pole, whereby telephonic communication may be secured at any point on the line.

Telephones in Churches.—The telephones in several churches in New York City are being used to good advantage. When pew holders find they cannot attend Sunday services they notify their church by telephone and in this way their pews, which would otherwise be vacant, are rendered available for visitors.

Meeting of Telephone Traffic Men in Texas.—Traffic representatives of the Southwestern Telegraph and Telephone Company, the Pioneer Telephone Company of Oklahoma and the American Telephone and Telegraph Company recently met in Dallas, Tex., to fix upon a standard method for the handling of long distance telephone calls in the Southwest.

Name for Telephone Messages.—Mr. Frederick O. Vaille, of Denver, Col., suggests the words "Telephogram" or "Telphogram" as names to signify telephone messages. These words he thinks are especially appropriate in their root derivation and otherwise for this particular use. He says: "Of the words you mention 'Phonogram' would be good, except that it would more appropriately be the name of a phonograph record and some day may be wanted for that purpose."

Telephone Bill Vetoed in Nebraska.—Governor Aldrich of Nebraska on April 12 vetoed the bill passed by the legislature providing for placing all telephone companies in the State under the control of the State Railway Commission. The Governor withheld his name from the bill for the reason that the measure would, he said, eventually result in a telephone monopoly and ultimately increase rates.

State-Owned Telephones in France.—The Association of Telephone Subscribers in Paris was non-suited in its action for damages against the State for interruption of the telephone service after the fire at the central telephone exchange three years ago. The court threw the case out on the ground that the State could not be held responsible for any damages caused by the interrupted service. It declared that if subscribers could claim compensation whenever the service was interrupted it would be impossible to carry it on. This was a test case on the part of telephone subscribers who have many complaints against the telephone service, which is a State monopoly.

Bell Telephone Changes in Middle West.

Five of the associated companies in the middle west of the American Telephone and Telegraph Company have been placed under one executive head, in conformity with the policy of the parent company to unify the work and effort of the constituent companies.

The companies concerned are the Michigan State Telephone Company, the Cleveland Telephone Company, the Central Union Telephone Company, the Chicago Telephone Company and the Wisconsin Telephone Company. Heretofore each of these companies has had a different president and a separate corps of general officers. The new plan contemplates one president and one corps of officers for the five companies, with specialists in the several branches of the whole work. There will be no change in the corporate existence of any of the companies nor will there be any consolidation or merger of the physical properties. The new operating unit is being established to enable the management to keep pace with the growth of the business and to insure uniform efficiency of the service everywhere.

Mr. Bernard E. Sunny, president of the Chicago Telephone Company and a vice-president of the American Telephone and Telegraph Company, has who has relinquished the duties of that office. been elected president of the Michigan State Telephone Company, vice Mr. N. C. Kingsbury Mr. Sunny thus becomes president of the five companies involved in this executive reorganization. Mr. Alonzo Burt, president of the Wisconsin Telephone Company, Milwaukee, Wis., has been elected vice-president and treasurer of the Michigan State Telephone Company, and Mr. B. W. Trafford, vice-president. Mr. H. F. Hill,

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formerly general manager of the Central Union Telephone Company, Indianapolis, Ind., is to be general manager of the five companies. Mr. B. S. Garvey has been appointed auditor, Mr. J. G. Wray, engineer, and Mr. L. G. Richardson, president of the Central Union Telephone Company, Indianapolis, Ind., general counsel.

Telephone Service in Italy.

Some years ago the Italian government bought from private companies the telephone systems of the country and undertook their operation. The service rendered has, according to a pamphlet issued by the American Telephone & Telegraph Company, New York, been very unsatisfactory under government management and is being severely criticized by Italian newspapers. At a meeting of the Naples Chamber of Commerce in November last the president, referring to the royal commission appointed to investigate complaints made of the telegraph, postal and telephone services, stated that he had brought to their attention the great delay in delivering telegrams and the execrable telephone service, and that he was obliged to say that since the government has taken over the telephone company the service has been far worse in every respect.

The annual cost of a telephone in Naples is $40 within a radius of 3,000 meters from the central office (about 1.8 miles); for every additional mile there is to be added about $10 extra annual tax. The cost of long distance telephoning is about forty cents between the principal cities, between 6 a. m. and 9 p. m., and one-half rate between 9 p. m. and 6 a. m., besides a fixed tax of ten cents for notice for a night call.

The estimate for expenditure on new telephones for the year 1910-11 is fixed at 5,260,000 lire (one lira is equal to 19 cents). From official statistics it appears that in 1910 there were 46,293 subscribers to the state system and 20,170 subscribers to private telephone companies. Since the installation of telephones in Italy the sum of 60,792,186 lire has been voted for the telephone service, all of which, except 9,200,215 lire, has been spent.

The Philadelphia-Washington Underground Telephone Cable Line.

We have in previous issues referred to the work now being carried on by the American Telephone and Telegraph Company in laying an underground cable between Boston and Washington. The section between Philadelphia and Washington will be completed during the fall of this year.

The conduit between the two cities is approximately 135 miles in length, which, added to the existing underground line between Philadelphia and New York, makes a total of about 235 miles. The wires used in these cables are larger than those employed on overhead lines and are so arranged that from each two pairs it is possible to obtain simultaneously three complete telephone and eight complete telegraph circuits. In addition there are contained within the cable sheath a number of pairs of smaller gauge wires for use between intermediate cities along the route. These pairs of the small-gauge wire may also be used for telegraph purposes. Altogether the cables contain 148 wires, which are arranged in 74 pairs and capable of giving 99 telephone and 296 telegraph communications simultaneously. As the cables, when completed between New York and Washington, will handle telegraph and telephone business to a number of cities along the route, it is evident that when working full capacity the actual number of simultaneous telegraph and telephone messages may be many times these figures.

At intervals along the cable the wires are connected to Pupin "loading coils." Nearly 10,000 of these coils are to be used between Philadelphia and Washington and their aggregate weight will be about 200 tons.

On the section between Wilmington and Washington the trench in which the cable is being laid is about 100 miles in length and in the distance between the two cities there are 75 bridges over which the cables are to be carried. The manholes are three feet wide by four feet six inches long, and are placed at an average distance apart of about 500 feet. One thousand of these manholes will be constructed along the line between Philadelphia and Washington.

On one section of this line a trenching machine is used to excavate the trench. This machine is capable of digging daily a trench 1,000 feet long, 18 inches wide and three feet deep. In the other sections a trench plow is used.

The Telephone in Berlin.

The telephone in Berlin is the subject of an article in the *Telephone Review*, by Mr. James H. Collins. As compared with American practice telephone service in the German capital is woefully inefficient, and, from Mr. Collins' account, is no better than any other State-controlled telephone service. He points out one of the principal handicaps to first-class service as follows: "The Germans," he says, "like all continental telephone authorities, are very keen in experimenting with automatic switchboards. In Berlin a small automatic with a couple of hundred subscribers is kept in a room by itself. The reason for this interest, according to an engineer thoroughly posted on foreign practice, is this: European telephone systems, being run by government, must be worked by employes who are taken on under civil service rules. The examinations tend to favor those who can pass a good scholastic test rather than the candidates showing special aptitude for telephone work. Political 'pull' saddles undesirables on the system. Employes agitate for privileges that hamper service. It seems to be next to impossible to improve the service along the lines of skill and personnel that are followed in America, and so the officials look to mechanical improvements to bring about better service."

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Telephone Improvements in Texas.

The Southwestern Telegraph and Telephone Company has just completed a six story building at San Antonio, Tex., which is now occupied by the business offices. The exchange will soon be removed to the new quarters. The switchboards will have a capacity of 9600 lines. At Houston preliminary work has begun on a seven-story steel structure which is to be used for exchange headquarters, and a new branch exchange building three stories high has just been completed at Fort Worth, Tex. This makes three exchanges in that city. In Dallas the fourth exchange is near completion. The buildings erected by the company are of the most substantial character and fire proof and everything connected with the service is most modern.

LETTERS FROM OUR AGENTS.

RICHMOND, WESTERN UNION.

Following is a list of the chiefs in this office: Chief operator, F. R. Veale; night chief operator, E. N. Dennis; all night chief, E. Wilkinson; traffic supervisor, J. W. Ware; assistant supervisor, R. E. Hotze; wire chief, T. B. Maher; day chief, J. L. Wingler; night chief, F. H. Muire. Repeater chiefs: H. H. Cramer, C. W. White, T. Farley, L. C. Surles, J. E. Stevens; ticker and equipment chief, R. L. Reveley.

Including extra men there are sixty-five operators and the total number of employes in the operating room is ninety. Mr. W. G. Sale, formerly of Wilmington, N. C., is manager.

Mr. W. N. Reveley, formerly of this office, is now attached to the office of district plant superintendent J. B. Faulkner in the capacity of district plant chief.

Mr. M. S. Cline, formerly of this office, is now wire chief at Lynchburg, Va.

During the past year, a number of improvements have been made in this office, including the installation of tungsten lamps, which give much better illumination. The operating room has been generally overhauled and various changes in the arrangement of desks and circuits have been made in order to facilitate the handling of the growing volume of traffic.

The new building on Main street between Eleventh and Twelfth streets, in which our main office is to be located, is nearly completed and it is expected that the new quarters will be occupied in July. The building is a thirteen-story fireproof structure of red brick, the floors being built of reinforced concrete. The receiving and delivering departments will occupy half of the first floor, and half of the cellar will be occupied by the line department. The superintendents' offices and the locker and retiring rooms will take up the entire twelfth floor and the entire thirteenth floor will be utilized as the operating room.

NEW YORK, POSTAL.

Mr. George D. Wilkinson, formerly of Boston, is printer expert now for this company at New York.

H. E. Ryder, an operator in this office, died at Elmira, N. Y., April 22.

An office has been opened by this company in the Martinique Hotel, corner Thirty-second street and Broadway.

The first examination questions were given out to the members of the Postal Electrical Class April 20, by the instructor, Mr. Donald McNicol.

The new office of this company at Syracuse, N. Y., was opened April 23.

NEW YORK, WESTERN UNION.

The baseball team of "Clark's" department at 195 Broadway, is open to meet any team of the Cable, Postal or Western Union companies. Mr. Robert Jablin is captain and Mr. Sam. Silverman manager.

Albert E. Sink, aged 62 years, formerly manager of the operating department of the Western Union Telegraph Company at 195 Broadway, New York, died April 21. He was born in Utica, N. Y., and his entire telegraphic career was spent in his native State. He became manager of the operating department at 195 Broadway, New York, in June, 1893, but retired from the service several years ago. Mr. Sink was a man of high principles and very conscientious in all his relations with his subordinates and others.

Municipal Electricians.

Convention of Municipal Electricians. — The next convention of the International Association of Municipal Electricians will be held at the Ryan Hotel, St. Paul, Minn., September 12, 13, 14 and 15. Any further information may be obtained of the secretary, Mr. Clarence R. George, Houston, Tex.

Los Angeles Fire Alarms.—The special committee of electrical experts appointed to investigate the local fire and police signal system at Los Angeles, Cal., has reported that an adequate system can be provided at an approximate cost of $102,500. The estimates provide for 150 additional fire-alarm boxes, underground cables, overhead extensions and central office equipment.

Fire Alarm Patents.—The following patents have been issued for fire-alarm and kindred apparatus: 989,107 to J. E. Barrett, Pollock, La., on a fire alarm; 989,335 to L. D. Chandler, North Abington, Mass., on a signal for fire sprinkler system and the like; 989,347 to Albert Goldstein, New York, on an electric thermostat; 989,420 to L. T. Reichel, Wellington, New Zealand, on a fire alarm system; 989,516 to N. H. Suren, Needham, Mass., on fire-alarm telegraph apparatus.

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New York Telegraphers' Aid Society.

Following is the statement of the New York Telegraphers' Aid Society for the year ending March 6:

Balance on hand March 6, 1910		$24,901.02
Receipts:		
From Dues	$5,524.50	
" Initiation Fees	50.00	
" Interest	1,204.16	
		6,778.66
Total		$31,679.68
Disbursements:		
Sick Benefits	$4,282.27	
Death "	1,600.00	
Expenses	720.25	
		$6,602.52
Balance on hand March 6th, 1911		25,077.16
Total		$31,679.68

Summary:		
Receipts	$6,778.66	
Disbursements	6,602.52	
Gain for year	$ 176.14	

RELIEF FUND

Balance on hand March 6th, 1910	$4,958.67
Receipts	946.92
Total	$5,905.59
Disbursements	$500.95
Balance on hand March 6th, 1911	5,404.64
Total	$5,905.59

BALANCES

Aid Society	$25,077.16
Relief Fund	5,404.64
Total	$30,481.80
Bonds and Mortgages	$20,416.24
On Deposit	10,065.56
Total	$30,481.80

F. J. Nurnberg, J. F. E. Hopkins, H. M. Heffner, auditors.

Lineman.—Wanted first-class lineman with sufficient knowledge of operating to receive orders and report. For station vicinity Chicago. Telepost, 135 E. 16th St., New York City.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York. 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

Mr. Robert B. Welch, an old-time telegrapher of St. John, N. B., died at that place on April 5. He held certificate No. 31 in the Telegraphers' Mutual Benefit Association. He became a member of the association when it was organized in the latter part of 1867.

T. M. B. A. Assessment.—Assessment No. 523 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Mrs. Alice A. Stuart at Wahpeton, N. D., Peter B. Westervelt at Brooklyn, N. Y., Arthur G. Tufts, at Dover, N. H.; Philip K. Dumaresq, at Boston, Mass.; John B. Page, at Montreal, Que., and Charles E. Wise, at Chicago, Ill.

Martin's Double Lever **VIBROPLEX, $8.00** f. o. b. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

WANTED.—Live agents in all large Western Union and Postal offices. Central Typewriter Exchange, New York.

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.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 9. NEW YORK, MAY 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Phenomena of Electricity.

To the average student the study of electricity has always been one of great fascination, but it is the close observer only who really understands and appreciates the wonderful properties and possibilities of that most mysterious force. To the latter class only are we indebted for the great electrical inventions and industrial electrical appliances of the present day. Each electrical industry has resulted from the observations of some investigator who looked below the surface and detected some peculiar action of the current which although not required in one industry might be utilized in another.

The trouble with most of us is we usually look upon an electrical appliance as a finished product, and, as a rule, are contented when we have mastered the general principles involved in its operation. Thus the invention of the electric telegraph by Prof. S. F. B. Morse was at one time looked upon as the ultimate limit of electrical possibilities, yet even then the current was constantly performing additional services before unappreciative eyes and disclosing the principles upon which nearly all the electric appliances of the present day are based.

All progress that has been made in electrical industries is due to such men as Edison, Marconi and other close observers who detected, one by one, the various side performances of an electric current. Hence the lesson to be learned is that new achievements should be sought in the by-ways, and not in the well beaten roads.

Let us analyze this first Morse circuit and see what else the current was doing besides performing its legitimate duty of creating a magnet of the iron core of the relay. Probably the most prominent performance was that of coating one of the battery plates with copper due to the chemical decomposition of the liquid solution in the jar through which the current passed. These copper deposits are, of course, not required in the creation of magnets and are unavoidable, but they disclose a side action of the current which enables us to use it for the purpose of electroplating.

An excess of current in a thin wire or coil disclosed the accumulation of heat, hence the suggestion of electric lights and heating apparatus constructed on the principle of high resistance and low heat capacity.

Then there was the disruptive spark every time the key was opened. How little did Prof. Morse then dream that he was sending wireless impulses throughout space in all directions every time he touched the key. The significance of this action of the spark in creating waves in the surrounding ether was, of course, unknown to the professor and others because such action remained undetected until later. But the spark was lighting the way even then and snapping out information which was finally heard by the acute ears of Marconi and utilized in a practical manner.

Two batteries of equal potential opposing each other at opposite terminals of a line created no current in the conductor, hence no magnetic effect, and it was some years later before the fact was observed that a magnet could be demagnetized while current was actually traversing its coils, by winding the core differentially. Hence the development of the duplex method of telegraphy.

In like manner we can trace each separate electrical appliance to the discovery of some particular property of electricity and no doubt the future will disclose as many more possibilities, manifestations of which, like the escaping steam in the famous tea kettle, are daily observed by as yet unappreciative eyes.

Aside from the practical view of the subject there are many interesting things in connection with an electric current, among which is the phenomenon of discharge.

An electrified conductor may be discharged in several different ways, which give rise to the terms "conductive," "disruptive," "convective," etc.

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A conductive discharge refers to the ordinary flow of a current through a closed conductor, such as a telegraph wire, or through the coils of a sounder.

When a conductor or metal ball holds a charge of bound electricity the induction which takes place in its immediate vicinity creates a mechanical stress upon the intervening medium. When the stress becomes too great the charge breaks through and manifests its passage by a bright spark. In this case it is called a disruptive discharge. The distance, or length of the air gap the discharge will leap across depends upon the potential of the charged terminals. With some of our powerful induction coils the stress may be made so great that glass plates two inches thick may readily be pierced or shattered. If a card board is thus pierced by placing it exactly between the two points of the conductor the perforation will show a burr on each side of the card, as though the force worked outward from the middle. If the two terminals are not exactly opposite each other the perforation will appear nearer the negative than the positive terminal, unless the experiment be made in a vacuum in which case the hole will be exactly midway between the two points.

We also have what are called convective discharges. These refer to electricity which flies off by repulsion under the influence of high potential and discharges itself at sharp points by reason of the great density at these points which electrifies the particles of air in the immediate vicinity.

POSITIVE AND NEGATIVE ELECTRICITY.

The different behavior of negatively and positively charged bodies which has been noticed in many experiments has given rise to the belief on the part of some investigators that the two actions are possibly the result of different kinds of electricity. The action of electric discharges in perforating card board, as previously referred to, is pointed out in support of this belief; also the different arrangement of dust or iron filings on a card under the influence of positive and negative electricity; the difference in the striking or the attractive force of electricities, etc., etc.

The correct answer probably is that positive and negative electricity are one and the same, the different behavior of the two being due to the fact that there is an excess of one over the other. This is the view taken by modern scientists, among them Prof. Sylvanus P. Thompson, who bases his opinion on the fact that all his experiments show that "the rate of dissipation of charge is always greater for negative electrifications than for positive, and the law of loss is the exact counterpart of the law of loss of heat."

Recent Telegraph and Telephone Patents.

ISSUED APRIL 18.

989,576 and 989,577. Telegraphy. To P. B. Delany, South Orange, N. J.

989,761. Telephone Lock and Call Register. To E. L. Buxbaum, Chicago, Ill.

989,762. System for Registering Calls and Locking Telephones. To E. L. Buxbaum, Chicago, Ill.

989,763. System for Registering Telephone Calls. To E. L. Buxbaum, Chicago, Ill.

989,768. Telephone System. To A. H. Dyson, Chicago, Ill.

989,792. Telegraph Relay. To Z. McD. Miller, Pittsburgh, Pa.

989,795. Sanitary Telephone Mouthpiece. To J. B. O'Hara, Philadelphia, Pa.

989,814. Auxiliary Telephone Receiver. To W. Schwarzhaupt, Cologne, Germany.

989,856. Telephone. To W. C. Lockwood, San Juan, Porto Rico.

990,275. Telephone Transmitter. To S. A. Koltonski, Boston, Mass.

990,365. Telephone Repeater Circuit. To C. A. Kruckow, Halle-on-the-Saale, Germany.

990,468. Telegraph System. To F. G. Agrell, Stockholm, Sweden.

990,484. Case for Telegraph Transmitters. To B. P. Hayes, Topeka, Kan.

990,485. Telegraph Transmitter. To B. P. Hayes, Topeka, Kan.

990,527. Telegraph Muffler. To F. W. Cook, Denver, Col.

990,638. Telephone Meter System. To G. Deakin, Oakland, Cal.

990,685. Telephone Signaling System. To E. M. Tormin, Newtown Center, Mass.

PATENTS EXPIRED.

518,742. Telephony. Issued to W. C. Lockwood, New York.

518,916. Telephone Transmitter. Issued to H. Cottrell, Newark, N. J.

Personal.

Mr. Stephen Dudley Field, the well known electrical engineer and inventor, of Stockbridge, Mass., was a recent New York visitor.

Professor Alexander Graham Bell, inventor of the telephone, will be honored at his birthplace, Brantford, Ont., by the erection of a memorial on Dominion day, July 1, 1912.

Mr. Chauncey A. Doty, a prominent and wealthy business man of Seattle, Wash., was formerly a telegraph operator at Marshalltown, Iowa. Among his many business connections Mr. Doty is vice-president of the Mercantile Bank of Seattle.

Mr. H. A. Sinclair, who for the past twenty-five years has served as treasurer of the New York Electrical Society and who recently resigned that position, has been presented with a testimonial in recognition of his faithful service during that period.

Mr. George V. Hobart, the well-known dramatist, was a telegrapher and several years ago worked for the Western Union Company in New York, and for the different press associations. Mr. Hobart is a natural born humorist and has been very successful in his theatrical work. He became a reporter

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and made his first success as a writer with his Dinkelspiel stories.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, has been urged to permit the use of his name as candidate for Governor of Vermont, but he replied that he is not seeking nor would he accept any such preferment. Mr. Vail owns a farm of 5,000 acres at Lyndonville, Vt., and is one of the largest land owners in that State.

Mr. Theodore T. Moore has been appointed to the position of chief of the telegraph division of the Weather Bureau at Washington, D. C., to succeed Jesse H. Robinson, deceased. Mr. Moore was Mr. Robinson's assistant for a long time.

Canadian Notes.

The Canadian Telegraph Toll Investigation.—The hearing of the telegraph toll case came before the Canadian Board of Railway Commissioners at Toronto on April 27. Mr. George D. Perry, general manager of the Great North Western Telegraph Company, Toronto, gave evidence regarding the status and financial results of the operations of the Great North Western Telegraph Company, and on April 28 Mr. F. Roper, secretary of the Dominion Telegraph Company, testified as to the relations of his company with the Great North Western, the Western Union and other companies. The Board then adjourned the hearing until some future date after statements of various kinds are prepared by the Canadian Pacific Railway and other companies. The investigation is based on a complaint made by the Winnipeg board of trade, but the issues involved are of general interest throughout the Dominion. It will probably be two months before the case comes up again.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Charles C. Adams, second vice-president of the company, is at Mt. Clemens, Mich., taking the baths for the benefit of his health.

Mr. Chrales P. Bruch, third vice-president, has returned from a trip to Newport, R. I.

Mr. S. M. English, general manager of the Postal Telegraph-Cable Company of Texas, was a recent New York visitor. He was accompanied by General A. P. Wozencraft, general counsel of the company.

Mr. D. T. Gage, Jr., of the electrical engineer's office, New York, who has been in Oklahoma City, Okla., for some time, assisting in the planning and equipping of new offices in that section, is now located at Dallas, Tex.

A 60-conductor cable laid from the Chicago main office to Hammond, Ind., a distance of 20 miles, is now in service.

A seventy-five pair cable (150 wires) has been laid by this company through the Pennsylvania Railroad's tunnel under the North River, New York. It has a total length of 17,000 feet and has an over-all diameter of 2⅛ inches. The conductors are of 14-gauge copper wire. The paper insulation is very compact.

Mr. F. A. Bivens of the Jackson, Miss., office, has been advanced to the managership of the Montgomery, Ala., office, vice W. A. Sheppard, resigned.

Mr. C. D. Ross, manager of the Huntsville, Ala., office, has been promoted to the management of the Jackson, Miss., office. Mr. M. S. Levy of Birmingham succeeds Mr. Ross as manager of the Huntsville office.

Mr. John A. Vogt, whose appointment as manager at Baltimore, Md., was announced in our issue of May 1, was born in that city Sept. 29, 1869. He entered the telegraph service as a messenger in Baltimore in 1883, and his entire business career has been spent in that city. He advanced from messenger to a clerkship, then became an operator, and afterwards manager of the dry goods district. Subsequently he was promoted to the managership of the produce district, and filled this position for seventeen years. From this position he was advanced to the managership of the main office.

Mr. Robert Harrington, a lineman for the Postal Telegraph-Cable Company, was killed in Douglas, Ariz., recently by a stray shot during a battle between insurrectos and Mexican troops along the Mexican border near that place.

Frank M. Hoops, a lineman of this company, stationed at Laconia, Wash., on the summit of the Snoqualmie Pass of the Cascade Mountains in that state, was frozen to death recently while working on a line during a recent cold wave. Mr. Hoopes had finished some repair work and it is believed that he intended to return to Wolf's ranch, two miles away, but, instead, while probably suffering from the extreme cold, went in the opposite direction. From marks in the snow it was evident that he became exhausted by the extreme physical exertions during his wanderings and finally succumbed to the strain. The body was found in the snow by searchers the next day.

The Postal Situation in Texas.—A temporary restraining order has been granted by Judge Clark of the district court of Oklahoma in the case of the Postal Telegraph-Cable Company of Texas, against the Postal Telegraph-Cable Company, a recently organized Oklahoma corporation. In the order the latter concern is enjoined against using the word "Postal" in connection with the word telegraph, at any place where the Postal Telegraph-Cable Company of Texas is engaged in business in that State. The name of the Postal Company organized in Oklahoma will therefore be changed to the Mackay Telegraph & Cable Company, and temporarily will do business under this name in the States of Texas, Oklahoma and a portion of Arkansas.

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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 returned from London, after an absence of five weeks.

Mr. Newcomb Carlton, vice-president, Mr. Belvidere Brooks, general manager, and Mr. W. C. Merly, secretary to the general manager, recently made a trip to the principal cities in the western division. They also visited Toronto, Ont.

Mr. Thomas W. Carroll, assistant to the general manager, left New York on May 9 for a western trip of inspection that will take him as far as the Pacific coast.

The following notice regarding typewriters has been issued on the authority of General Manager B. Brooks: "As the company has under consideration the question of supplying typewriters as a part of the regular equipment of offices for such employes as are required to use typewriters, I think it would be well to advise employes of the fact, in order that they may not be led to incur an expense for replacing machines which can possibly be continued in use for the present. The matter will be decided as soon as certain tests of various standard typewriting machines now being made are concluded, which, it is anticipated, will be in about six months, and in the meantime we should avoid as far as possible the purchase of machines for use in the departments at current prices." It is understood that the competition will be confined to "visible" typewriters and that the trial will be open to any standard first class machine.

The following general notice has been issued by General Manager Belvidere Brooks: "It being the desire of the management to correct conditions affording just cause for complaint on the part of the employes of this company, employes are hereby informed that they may address to the general manager at New York any complaint growing out of what they consider arbitrariness, discrimination, prejudice and the like. Before such complaints can be considered by the general manager, the employe must first have made the complaint in writing to his or her immediate superior. If the employe is dissatisfied with the decision, or if the complaint does not receive attention, then a copy of the complaint may be forwarded to the general manager with such statement as the complainant may deem necessary or desirable. All communications upon this subject from employes will be regarded by the general manager as confidential, in so far as he is able to preserve their confidence without impairing the efficiency of his inquiry. It must be distinctly understood that complaints of a trivial character or involving personal abuse will not be considered. All complaints and communications must be signed by the writer's full name and address." In forwarding this notice to his district officials, General Superintendent A. G. Saylor, of New York, says: "It is important that in the promulgation of the above regulation it should be fully comprehended by managers and subordinate officials generally that the notice means exactly what it says and that employes everywhere are to receive fair treatment and will be protected against favoritism or discrimination resulting from personal prejudice, etc. It should also be understood that no employe is to be at any disadvantage by reason of any appeal of his or her case after failure to secure local redress in accordance with the regulations as now established."

Mr. C. H. Murphy, manager of the time service of this company, has been advanced to the position of general superintendent of the same service, with headquarters in New York.

Three hundred of the new standard quadruplex sets have already been installed. The New York-Syracuse quadruplex has been in continuous operation for a year and has worked all four corners through all kinds of weather without any difficulty.

One thousand of the new standard resonators have been placed in service. This device was developed by the engineering department of the company. The resonator is mounted at the end of a double-jointed iron arm which is supported by a vertical iron pedestal fixed to the desk top. This construction permits of placing the sounder in any position on the plane swept over by the arm. The resonator is of new design, the form having been adopted after many experiments to determine the best shape for reflecting the sound.

The appointment of Mr. A. C. Terry as district commercial superintendent of this company at Pittsburg, Pa., has been received with much satisfaction by the business men of that city. The Chamber of Commerce of Pittsburg, through its president and secretary, has congratulated Mr. Terry and expresses its assurance that when he says he will "give the people the service they want" he will "deliver the goods." Mr. Terry has a well-defined business platform and he promises to give the company's patrons courteous treatment at all times and the best possible service.

Mr. Allan Woodle, formerly manager at Boston, Mass., has been appointed district commercial manager with headquarters at Syracuse, N. Y.

Mr. W. W. Murphy has been appointed manager at Savannah, Ga., vice Mr. H. A. Carroll, resigned.

Mr. B. F. Ragsdale, the recently appointed chief operator of the Western Union Telegraph Company at Augusta, Ga., comes from the Hoosier state, having been born in Washington, Ind., December 12, 1869. He entered the telegraph service in that place in August, 1892, and has since filled positions as operator at New York, Washington and St. Louis, and at Buffalo, N. Y., he filled the positions of repeater chief, wire chief, assistant chief operator and general

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wire chief, holding the last named position at the time of his appointment as chief operator at Augusta. On his leaving Buffalo he was presented with a diamond stick pin by his associates in the plant department, as a token of their esteem and friendship.

Mr. J. R. Parker, formerly chief clerk to division commercial superintendent J. M. Stevens, of Atlanta, Ga., has been made chief clerk to district superintendent J. S. Calvert, of Richmond, Va.

Miss Julia Jennings, for a number of years in charge of the complaint department at Richmond, Va., has been transferred to the same department in Atlanta, Ga.

Mr. Ernest L. Sollers, operator at Baltimore, Md., has been appointed district traffic supervisor, with headquarters at Boston, Mass.

H. O. Bannister, manager of the Western Union Telegraph office at Raleigh, N. C., died suddenly at Richmond, Va., May 2. His death was particularly sad. Mr. Bannister's wife and infant son were accidentally suffocated by gas at their home in Raleigh on January 6 last, and the shock to Mr. Bannister was so great that he has never acted like himself since.

Mr. W. B. Stuart, former manager at Savannah, Ga., has been appointed manager at Greenville, S. C., vice Mr. D. F. Cason, resigned.

Mr. J. T. Warner has been appointed chief clerk to superintendent E. E. Williams at Atlanta, Ga., vice Mr. W. G. Peebles, resigned.

Mr. C. B. Wade has been appointed manager of the Raleigh, N. C., office, vice H. O. Bannister, deceased.

Mr. J. W. Stephenson, of the Raleigh, N. C., office, has been appointed manager at Rockingham, N. C., vice C. G. Traywick, resigned.

Mr. J. S. C. Murphy has been appointed district manager for the State of Virginia with headquarters at Richmond, and Mr. E. T. Moore has been appointed district manager for the State of North Carolina with headquarters at Raleigh, N. C. The positions of district commercial agent held by both of these gentlemen have been abolished.

Mr. W. A. Sheppard, manager of the Postal Telegraph-Cable Company at Montgomery, Ala., has been appointed manager for the Western Union Telegraph Company at the same place. Mr. Sheppard's first commercial work was for the Western Union Company in New Orleans, in 1879, and in 1883 he was transferred to the Atlanta, Ga., office. He afterwards went with the Southern Telegraph Company at Savannah, and later with the Associated Press at Anniston, Ala. He left the Associated Press service in 1889 to accept the managership of the newly opened office of the Postal Telegraph-Cable Company at Anniston, and in 1893 he was transferred to the Montgomery office of the same company. He held this position at the time of his recent appointment to the Western Union managership.

Mr. Stephen Latimer Burts, whose appointment as commercial superintendent of the third district, Southern Division, at Jacksonville, Fla., was announced in our issue of April 16, was born in Abbeville County, S. C., forty years ago. In October, 1899, he entered the telegraph service at Chester, S. C., on the Richmond and Danville Railway, now the Southern Railway. He held the positions of operator, bookkeeper and chief operator at Columbia, S. C., for the Western Union Telegraph Company between December, 1892, and September, 1896, and was manager of the Charlotte, N. C., office from the latter date until December 31, 1904. He became manager of the Atlanta office on January 1, 1905, and in August, 1906, was appointed general inspector of the Southern Division, which position he held until February, 1909, when he resumed the managership of the Atlanta office. From this position he was promoted to the present one of commercial superintendent. Mr. Burts has been in the service of the Western Union Telegraph Company continuously since 1892.

Atlantic & Pacific Telegraph Company.—At the annual meeting of the Atlantic & Pacific Telegraph Company held in New York recently the following directors were elected: Theo. N. Vail, Newcomb Carlton, G. W. E. Atkins, A. R. Brewer, B. Brooks, Thomas F. Clark, George H. Fearons, E. J. Hall and J. B. Van Every. At a subsequent directors' meeting the following officers were elected: President, Mr. Theo. N. Vail.; vice-president, Mr. Thomas F. Clark; treasurer, Mr. A. R. Brewer; acting secretary, Mr. F. W. Lienau.

A New Telegraph System.—Experiments are being made by Messrs. Siemens & Halske, Berlin, Germany, with a new telegraph system which, it is said, is similar in principle to that of Pollak and Virag. It includes a typewriter key board which perforates the character on a wide band of paper. It is stated that the system can be operated at a speed of 300 words per minute.

One Way to Stop Gambling in Futures.—Congressman Burleson of Texas has introduced a bill in Congress "to stop gambling in cotton futures," by denying the use of telegraph and telephone wires for transmission of messages relating to contracts for future delivery when there is no intention on the part of the seller to deliver the cotton or the buyer to take it.

The Bangor Fire.—On April 30 a conflagration destroyed a large part of the business and residential sections of Bangor, Me. The Western Union telegraph office was destroyed, but the Postal Company's office escaped. The telephone exchange was also destroyed, as well as the electric light station and street railway power house.

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Quadruplex Printing Telegraph.

Mr. Isidor Kitsee, of Philadelphia, has recently obtained a patent on a quadruplex printing telegraph system. While the device is applicable to different systems of printing telegraphy its greatest value is most apparent in a system in which the groupings of the different characters of the Morse alphabet are made use of for the purpose of selecting locally the required type. Mr. Kitsee makes special reference to the Barclay printer in this connection. He uses standard apparatus, with the addition thereto of instruments which can be secured at a very small cost.

At the transmitting end a device similar to the Wheatstone transmitter is employed as contact maker. The perforated tape as it passes through the machine closes the circuit through the coils of a differentially-wound polarized relay. The armature lever opens and closes a circuit which includes a portion of the main line battery which is cut in or out according to the position of the armature lever of the neutral relay transmitter, also included in the circuit. When the neutral relay is closed the entire battery is shunted, but when it is open the battery is connected to the line. This battery is divided into two parts, which are connected in opposition, one of the parts being subdivided in the proportion of about 1 to 2. The entire battery with exception of the small portion referred to is controlled by the neutral transmitting relay.

A second polar-relay transmitter, which is also operated by perforated tape, controls the smaller portion of the battery, the circuit including the battery, the armature lever of the second polar relay and the front contact point of the neutral transmitting relay just referred to. The general operation of the transmitting apparatus, it will thus be understood, is similar to that of the standard quadruplex.

At the receiving end the apparatus is also standard as far as connections are concerned, impulses operating the polar relay and the increase or decrease of current strength controlling the neutral relay in the usual manner. The contact point of both these relays control through secondary polarized relays the circuits which operate the sunflowers of the printing telegraph apparatus.

The last two claims of Mr. Kitsee's patent read as follows: "In a telegraph quadruplex printing system, four receiving stations, two stations for each terminal of the line of transmission, a neutral relay inserted in the line for one station of each terminal and means for said relay to make the same inoperative to home impulses, a localized circuit, a polar relay and source of current in said circuit, said circuit adapted to be operated by said neutral relay, a second local circuit, a step-by-step movement in said second circuit, said second circuit adapted to be operated by the localized polar relay, said step-by-step movement adapted to operate different printing organisms; a polar relay for the second station of each terminal, means for said polar relay to make the said inoperative to home impulses; a localized curcuit, said circuit adapted to be operated by the polar line relay; a second local circuit, a step-by-step movement in said circuit, said second circuit adapted to be operated by the localized polar relay, said step-by-step movement adapted to operate printing organisms.

"In quadruplex printing telegraphy, the method of transmitting and receiving character symbols which consists in locally developing at a transmitting station a short positive and a short negative impulse producing thereby an impulse of predetermined polarity and of a length to accord with the length of the character symbol to be transmitted, transmitting such impulse to a receiving station, producing from such transmitted impulse two impulses, and translating such impulse into a separate symbol, one impulse indicating the beginning and one the ending of such symbol."

Municipal Electricians.

The Convention of Municipal Electricians.—Active preparations are going forward for the convention of the International Association of Municipal Electricians at St. Paul, Minn., September 12, 13, 14 and 15. An interesting programme is being arranged and many valuable papers will be presented on topics of special interest to the members. This promises to be one of the best meetings ever held by the association and a large and enthusiastic attendance is looked for. Mr. Clarence R. George, Houston, Tex., is secretary of the association.

Improved Fire Alarm System in Baltimore.—An index system of fire alarms has been put into service in each of the fire department houses in Baltimore, Md., as well as at headquarters. By this system a box can be picked out as it rings off on the gong, so that at the instant of the completion of the alarm a card is exposed to view which gives full information needed by the department. The system covers the city boxes on street corners, boxes in large establishments and in private houses, automatic stations and American District Telegraph stations.

Test of Mail Catching Device.—Mr. J. L. Adam, formerly cashier of the Western Union Telegraph Company at New Orleans, La., has invented a device for picking up mail bags at stations where trains do not stop. A practical test was recently made of the apparatus and the results are said to have been satisfactory.

Mr. Edward Reynolds, auditor of the Postal Telegraph-Cable Company, New York, in renewing his subscription writes: With my subscription for another year, I wish to express my appreciation for the valuable information received through your publication. Without it, I should miss much interesting data."

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E. C. Sweeney, American Traffic Manager, French Telegraph Cable Company.

Mr. Edward Charles Sweeney, whose appointment as traffic manager of the French Telegraph Cable Company and manager of the United States and Haiti Telegraph and Cable Company, with headquarters in New York, was announced in our April 16 issue, was born in Liverpool, England, April 13, 1857. He began his telegraphic career in his native country in 1869, entering the service of the Electric and International Telegraph Company. He afterwards served the London and Northwestern Railway Company, the British Post Office and the

E. C. SWEENEY,
American Traffic Manager, French Telegraph Cable Co., New York.

Direct United States Cable Company, being with the latter both in England and at Torbay, Nova Scotia.

When the French Cable Company commenced business in 1879, Mr. Sweeney was the first operator appointed by the company and has remained with it ever since. For twenty years he was stationed at St. Pierre, Miquelon, as clerk in charge and filled the same position in New York for three years, being then promoted to the position of superintendent of the company with headquarters in New York, which position Mr. Sweeney held at the time of his recent promotion.

Mr. Sweeney is well known in telegraph and cable circles and is one of the few remaining experts in the reflecting galvanometer system of operating ocean cables. He is a fine scholar and speaks French fluently. His appointment creates great satisfaction in telegraphic as well as business circles.

Sea Water as a Pole Preservative.—It is stated that soaking telegraph poles in sea water lengthens their lives. Some poles immersed several years ago were found to be quite sound. The treatment is said to be quite satisfactory.

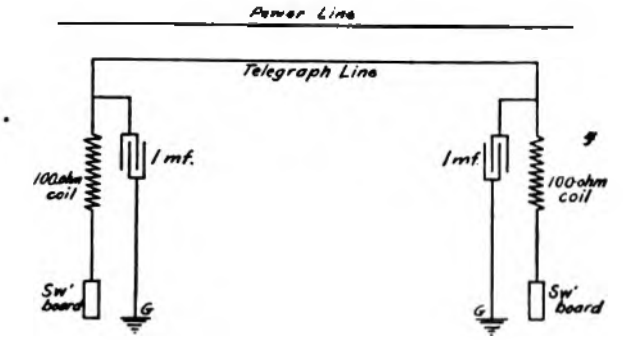
Mr. Wilbur Frewerd, manager Western Union Telegraph Company at Ishpeming, Mich., in renewing his subscription writes: "Telegraph and Telephone Age is certainly a great publication."

Inductive Disturbances Between Telegraph and Power Transmission Lines.

BY E. D. HUBBARD, GENERAL FOREMAN OF TELEGRAPH, GRAND TRUNK RAILWAY SYSTEM, BATTLE CREEK, MICH.

During the past winter a high tension power line was constructed adjoining our right of way for a distance of fourteen miles. As this line was of steel tower construction with suspension insulators designed to carry 100,000 volts, and was only to carry a 40,000-volt, 60-cycle, three-phase current, no trouble was expected, since similar lines at other points had caused no interference.

When the line was finally completed, and the current turned on all of our single Morse wires were badly affected. All relays were set to chat-



ELIMINATING INDUCTIVE DISTURBANCES ON TELEGRAPH LINES.

tering and could not be adjusted so as to overcome the disturbance and still respond to the telegraphic impulses. The power company claimed that its lines were perfectly balanced, free from grounds, and that it could not cut in transpositions in its lines without constructing extra towers.

It being necessary to clear the trouble from the telegraph wires as quickly as possible retardation coils were placed in the telegraph circuits at the first stations each side of the exposed section and condensers were bridged from lines to ground between the coils, as shown in the accompanying illustration. This removed the trouble entirely and the telegraph circuits apparently worked as well as ever. One hundred-ohm retardation coils and one-microfarad condensers were used.

Report of Bacteriological Tests by Telegraph.—Dr. Frederick C. Novy, head of the bacteriological department of the University of Michigan, Ann Arbor, Mich., while making tests of a new filterable virus which were to form the basis of a paper to be read at a medical conference in Chicago, was compelled to leave the determination of the results to his assistants at the college, so as to enable him to leave for that city. The results of the tests were telegraphed to him in detail, thus he was enabled to formulate his conclusions at long distance.

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Postal Company's Standard Duplex and Quadruplex Local Wiring.

BY J. F. SKIRROW, ASSOCIATE ELECTRICAL ENGINEER POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The accompanying cut illustrates the Postal Telegraph-Cable Company's standard method for wiring duplex and quadruplex local circuits. From the fuse block on the table leads are run to three-point switches—one for each local circuit. The circuits run thence through the local windings or contact points of the instruments, thence to another three-point switch, and from that switch to spring jacks, resistance coils and the ground at the legboard.

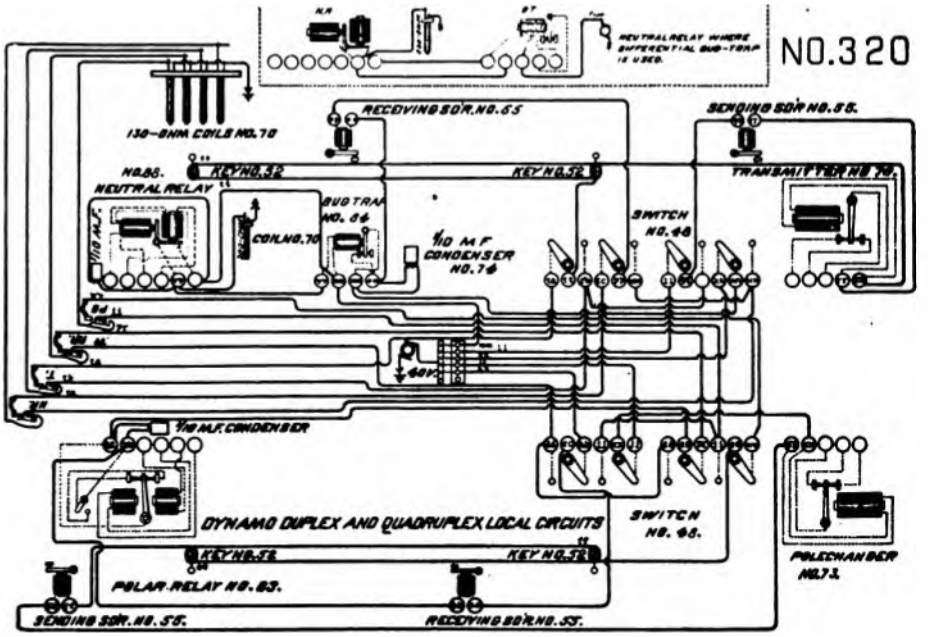

DIAGRAM OF DUPLEX AND QUADRUPLEX LOCAL CONNECTIONS.

Throwing the first switch to the left substitutes the ground for the battery feed. Throwing the second switch to the left cuts off the spring jack and any connections made through it for repeating or to branch offices. This gives the attendant at the set complete control of the local circuit without going to the switchboard to make changes.

By throwing the switches at one set to the left and at another to the right and connecting their jacks together at the legboard by cords, any two sets can be made to repeat into each other.

By throwing the switches on a set one to the right and the other to the left, the local instruments of any set can be picked up as loops at the spring jacks, and thereby used as "flip-downs" upon other sets. In normal service all switches are turned to the right. On an idle set all switches are turned to the left.

The connections permit the substitution of grounded legs to branch offices for the office resistance coil and ground so that sets may be repeatered through with a branch office connected upon grounded legs.

The binding posts upon all keys, switches and other apparatus are located on top so that loose connections under the tables are avoided. All switches have safety spring clips, thus avoiding open circuits due to poor contact.

Making Work Hard.

"Work is easy enough. It's watching the clock that makes it hard."

This gem is from Cooke, the poet-philosopher, and is reasonably good proof that he knows what he is talking about. The man who is having the hardest time with his work, says *Railroad Men*, is the man who is running it through the eight-hour measure. It is not his work that is killing him; it is keeping track of the clock. No wonder there is no ray of joy in his task and no sense of achievement in the doing of it.

The man who finds pleasure in his work is he who takes a little pride in it; who, forgetting the time of day and the day of the week, puts some of his best self into the daily work. The "dead ones" are the men who are careful not to do too much; who never check six sheets while they can hold their job by checking four. And they are the men who blast the futures of young fellows by such talk as: "Don't kill yourself for these people. You'll never get any thanks for it. I've been here sixteen years and I'm getting just what I got when I came here. Take it easy or they'll think you are a fool."

When you hear talk of that sort you may be sure you are listening to the sophistry of a failure. Instead of heeding him, shun him, and go on giving good measured. Do not flock with the clock-watchers if you care anything about your future.

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The Train Dispatcher and the Telephone.*

BY VAN A. WIRT.

Train dispatching has been revised and revolutionized time and again in the effort to keep pace with advances in other departments of railway operation, but with modern equipment, ballasted roadbeds, improved grades, automatic block systems and the standard code of rules, train dispatching still follows in the wake of advanced methods, struggling to overcome the obstacles incident to heavy and rapid traffic. Despite the fact that invention has made wonderful strides in providing labor-saving devices and safety appliances, the train dispatcher has not been lifted very far from his old position of heavy nervous strain and responsibility. Today, as always he stands directly in charge of the movement of trains. His success depends upon his ability to quickly foresee and forestall. He is, in one respect, the most independent, and in another, the most dependent, employe of a railroad. No one can stand over him and successfully direct his work, while, on the other hand, without the co-operation of officials, train and enginemen and operators, he is a failure.

The telegraph, in recent years, has been the ever present "sticking brake" to the train dispatcher. It prevents quick and effective communication of orders to the men who are to execute them. The dispatcher's work has been so far behind his thought that the effect of a well-laid plan is often lost before it is possible to transmit the required orders to all concerned. Telegraph operators at way stations are too frequently amateurs and are often sadly incompetent. The suspense and mental strain upon the dispatcher while calling offices for orders or to procure information incident to the movement of trains, has made physical and nervous wrecks of many otherwise successful men.

The use of the telephone for operating trains is one of the greatest steps ever taken by the railroads to put the train dispatcher on his feet. The bell in place of the telegraph call solves the problem for prompt service on the part of the operators. Good English in place of the Morse alphabet eliminates the poor telegrapher from the dispatcher's category of troubles, and reduces misunderstandings to a minimum.

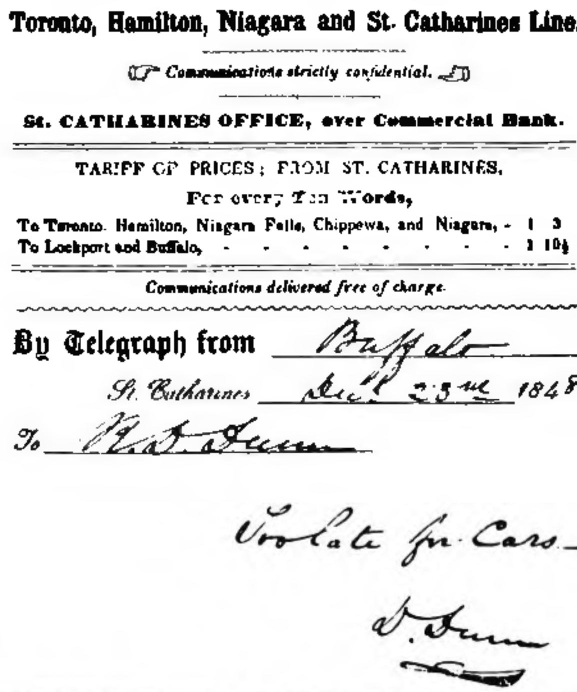
The telephone permits an element of personality to enter into the work, which is far reaching in its good effect and which is impossible with the telegraph. Direct communication with conductors, engineers, yardmasters and officials, in cases of congestion, engine failures, accidents or severe weather, permits of a more thorough understanding of conditions and quicker action in making arrangements to overcome irregularities than is possible through a number of telegraphic messages.

Prejudice against the telephone on account of its liability to get out of order and the interference of outside persons, is ungrounded when the system is properly installed and where proper discipline is maintained among employes having access to the instruments. The telephone will work satisfactorily through weather conditions which often render the telegraph useless. All other things being equal, it is fair to say that a dispatcher can handle one-third more business on a single track with the telephone than with key and sounder, and do it with less effort and with less delay in traffic.

*Railway and Engineering Review.

An Early Canadian Telegram.

In our issue for April 16 we gave a reproduction of an old telegram, received at Cincinnati from Philadelphia on November 28, 1848. These were the days when the electric telegraph was truly "in its infancy." Our Canadian neighbors were not slow, however, to appreciate the importance of the new means of communication of intelligence, for they too contemporaneously applied the telegraph to their needs.



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By Telegraph from Buffalo

St. Catharines Dec 23rd 1848

REPRODUCTION OF EARLY CANADIAN TELEGRAM.

The accompanying cut is a reproduction of an early Canadian telegram, dated December 23, 1848, about a month later than the one previously mentioned. It was loaned to us by Mr. James Kent, manager of telegraphs, Canadian Pacific Railway, Montreal, Que. The paper on which it is written is well preserved although the ink has faded somewhat indicating its age.

Mr. J. Schanher, a prominent druggist at Mount Clemens, Mich., formerly and for many years manager of the Western Union Telegraph Company at that place, in renewing his subscription for another year says: "It gives me great pleasure to renew my subscription for Telegraph and Telephone Age."

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Simplified Wireless Telephony.

In an article in the *Electrical World* Mr. M. Freimark briefly describes some experiments he made in wireless telephony and brings out some facts which he thinks should be followed up.

In the spring of 1910, he says, while making experiments to devise a method for locating open circuits in insulated and concealed wiring, it was found that the human body acts as an excellent antenna and detector and responds remarkably to the slightest excitation from electromagnetic waves or static induction. Having perfected this method for localizing breaks in telephone wiring, a close resemblance was observed between the apparatus and a miniature wireless-telegraph sending station.

The sending outfit being identical — from a purely theoretical point of view—in the two cases, one could not help thinking why the receiving station should not be the same, and why, in particular, it should not be used for wireless telephony. To this end it was necessary merely to change the sending station to a talking circuit. An operator's telephone set answered the purpose. A few dry cells were put in series with the transmitter and the primary side of the induction coil. One terminal of the secondary was grounded, the other one serving as the sending antenna. The receiving station consisted of a telephone receiver with one terminal connected to the body (ear or finger) and the other one to a wire which trailed on the ground or was directly connected to ground for the purpose of better receiving. The results were as anticipated. The sounds were audible a few feet from the antenna.

Further experiments with a phonograph, in connection with a small step-up coil, such as is used in wire-telephone practice, brought out the fact that the phonograph could be heard through the receiver anywhere in a good-sized living-room when the wire was concealed under the rugs. Metal, such as a brass bedstead or a tin roof, readily takes up the waves, acts like a sounding board and gives them off with seemingly increased strength.

It is doubtful, Mr. Freimark states, whether a transmitter of the present type will ever be developed to withstand currents strong enough to serve directly for wireless transmission. However, there is no doubt that combinations of this transmitter with generators, transformers, arc lamps or coils can be made which will be able to transmit sound within the limits of any city, and for overland or oversea transmission very high frequency waves can be used as the carrier.

Like wireless telegraphy the method described has the disadvantage of publicity, and even more so since anybody equipped with a receiver can pick up the message; for the same reason it also has the good side — though it is only one-way transmission—that it is accessible to everybody, rich or poor.

A city equipped with such a station could, Mr. Freimark thinks, send out orders to the whole police force in an instant, publish election or ball-game returns, give free concerts to the whole population and accomplish a good many other things which would tend to better the social life of its citizens.

Telephone Rates in Louisville.—Judge Evans, in the Federal Court for the Western District of Kentucky, has granted a permanent injunction in favor of the Cumberland Telegraph and Telephone Company restraining the City of Louisville from enforcing telephone rates fixed in an ordinance recently enacted.

Connecticut Telegraph Company Purchased By Southern New England Telephone Company.

The board of directors of the Connecticut Telegraph Company, New Haven, Conn., has decided to wind up its corporate existence, the plant of the company having been purchased by the Southern New England Telephone Company. The stockholders of the Connecticut Telegraph Company held a meeting in New Haven on May 10 and ratified the action of the board of directors.

New England Telephone and Telegraph Annual Meeting.—At the annual meeting of the New England Telephone & Telegraph Company May 1, Mr. William J. Denver was elected a director to take the place of Mr. H. S. Hutchinson, deceased. The other directors were all re-elected. The following executive committee was selected: Messrs. Thomas Sherwin, Jasper N. Keller, Theo. N. Vail, Moses G. Parker, and Union N. Bethell. At the subsequent directors' meeting the retiring officers were re-elected, with Mr. Jasper N. Keller as president.

Half-Automatic Telephone System in Amsterdam.

A half-automatic telephone system is being practically tested by the telephone authorities in Amsterdam, Holland. The system is thus described: Instead of a table showing the number of the subscribers, as in the old way, a device is provided with five rows of buttons, each row comprising ten buttons, representing the figures from one to ten. The first row represents ten thousands, the second thousands, the third hundreds, etc. The glowing of a small incandescent lamp indicates when a subscriber desires connection. The girl asks the number, in the usual way, and then effects the connection by pressing different buttons. For instance, if 13,785 be requested, she presses button one of the ten thousands, three of the thousands, and so on. Instruments in the office then rise and turn, making the connection. The telephone girl seems to do what the subscriber does in the full-automatic system. If the connection is made, the subscriber hears a ringing sound. If the desired line is engaged, he hears a blowing noise.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage." New York.
Telephone: 6657 Barclay

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.

May 16, 1911.

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

Two Important Western Union Orders.

Two noteworthy steps in the direction of improving the conditions surrounding the employes have recently been taken by the Western Union Telegraph Company; one in providing typewriters for the operators at the company's expense, the other having for its purpose fair treatment of employes.

The decision of the company to supply its operators with typewriters is a step in the right direction and yet, we can readily understand, it is one that is fraught with difficulties in its practical application. It has often been asserted that the companies should provide its operators with typewriters just as it does keys, sounders, etc.; one is as much a part of the operating equipment as the other. The typewriter was introduced by the operators themselves on their own volition, but with the permission of the companies to use it, and it has for this reason not had what might be called an official standing. It is easy, however, to find an explanation for the apparently anomalous conditions. When keys, relays, batteries, etc., were adopted they were actual necessities in the transaction of business, but the typewriter came rather as a luxury. We often hear the statement that the luxury of to-day becomes a necessity to-morrow, and so it has proven in the case of the typewriter. It has become part of the equipment of all first-class offices, and its adoption has met with the favor of the public and the companies alike.

Now, the time having become ripe, it has been officially recognized, and there can be little question as to the wisdom and justice of this important step.

As to the other order. It is unfortunate that conditions existed that should give rise to its necessity. Its object is to secure fair treatment of employes at the hands of their official superiors. It seems that complaints have been made of favoritism, prejudice, etc., against some employes. An appeal to the minor officials does not always bring relief, so now the general management has constituted itself a court of arbitration to investigate and settle such questions. The company is desirous of protecting the interests of its employes and securing justice in all its dealings with them, and the step it has taken in this direction will certainly receive the approbation of all concerned.

Telephone and Telegraph Companies Subject to the Rate Act.

The Interstate Commerce Commission at Washington has issued conference rulings in which it it held that every telegraph and telephone company which does interstate business is subject to the provision of the amended rate law. If such a company, the line of which is wholly within a single state, receives a message within the state for transmission to a place outside and delivers it to an interstate line for transmission to its destination, the first-named company is not subject to the act unless there is an agreement for through continuous transmission of business, in which case all participating companies are subject to the act. They are also forbidden to give rebates or other special advantages and are subject to the orders of the commission respecting the keeping of accounts and memoranda and the making of reports. The transmission of telephone messages from one state to another in a like manner constitutes interstate commerce and brings all of the participating lines within the purview of the act.

Object to Removal of a Telegraph Office.—The citizens of Wapakoneta, Ohio, are advocating the confiscation of the property of the Western Union Telegraph Company and the Cincinnati, Hamilton and Dayton Railroad because the telegraph office at the station has been moved to a point six blocks away.

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Opening of the New York-Denver Telephone Line.

On the evening of May 8 the American Telephone and Telegraph Company gave an exhibition of the working of its new telephone circuit between New York and Denver, a distance of 2,011 miles. This new circuit marks a very important advance in the development of long-distance telephony. For a number of years telephone service between New York and Chicago and St. Louis, over distances of about 1,000 miles, have marked the practical limit of commercial long-distance talking. By the recent advances which have been made in the development of long-distance lines, this range has been extended to over 2,000 miles, as shown by the tests on the evening of May 8.

A number of newspaper men in New York and Denver were assembled at the telephone company's offices in these cities and talked to each other over the new line, thus receiving an actual demonstration of its capabilities. At the New York end the tests were carried on from the company's offices at 15 Dey Street. Among those present on the American Telephone and Telegraph Company's staff were: Mr. N. C. Kingsbury, vice-president; Mr. J. J. Carty, chief engineer, under whose direction the work the results of which were shown has been carried on; Mr. Charles H. Wilson, general superintendent; Mr. H. S. Brooks, general commercial superintendent; Mr. B. Gherardi, engineer of plant; Mr. Frank B. Jewett, transmission and protection engineer, who, under Mr. Carty's direction, has carried on the work resulting in the New York-Denver service; Mr. H. V. Briesen, Mr. C. A. Robinson, engineer, and Mr. G. C. Pratt.

Mr. Carty explained to those present that the success of the line was due to developments which have been made during the last two years, without which the line would have been an economic impossibility One of the important developments embodied in the new line was the application of the so-called Pupin loading coils to the large gauge (No. 8 B. W. G.) copper circuits used for very long haul telephone conversations. While for about ten years the American Telephone and Telegraph Company and its associated companies have been making very successful applications of loading coils to underground cable circuits and to the aerial cable circuits of No. 12 gauge wire which are used for moderate distances, it has been, up to very recently, impracticable to apply loading coils to No. 8 B. W. G. circuits on account of certain losses which occurred all along these lines when such loading coils were used. These losses arose from the fact that when a very large gauge wire is loaded it is necessary that there should be a high degree of perfection in the insulation all along the line. The No. 8 circuits, when loaded, are so efficient that minute leaks and losses here and there along the line, which would be insignificant with smaller and less efficient wires, become of controlling importance and must be guarded against to obtain successful results. Consequently it was necessary to climb every one of the 87,000 telephone poles carrying the wires between New York and Denver and to substitute new and better insulators for the 285,000 insulators used on the wires concerned in the circuits between New York and Denver. In addition, at a number of special points where it was known that leakage was especially likely to occur, further and special steps were taken to eliminate this possibility. The very best experts and engineers worked on this problem for a considerable length of time and the results obtained in the tests are proof of the success of their efforts. Another important improvement which contributed substantially to the results obtained was the working out of arrangements by which these high-grade loaded circuits could also be phantomed and the phantom circuit thus produced loaded. This required much special work and invention in connection with the adaptation of loading coils to this special class of service. By these developments it is possible to get out of four wires three telephone circuits of efficiency heretofore unattainable and at the same time that these wires are being used for telephone conversations to carry on over them eight telegraph communications. These results between New York and Denver have been attained, as described, by the use of existing circuits, at a total expenditure of about $100,000. Had the company undertaken to obtain these same results without the developments referred to and by the stringing of additional copper circuits sufficiently heavy to permit of talking between New York and Denver without loading or phantoming, the expenditure required would have been about $1,600,000.

The opening of telephone communication between New York and Denver marks an important step in the project of giving telephone service between the Atlantic and Pacific coasts of the United States, a distance of about 3,000 miles. Until the completion of the developments which made the New York-Denver line possible, the practical range of commercial telephone communication was about 1,000 miles. It has now been extended to about 2,000 miles. One more step like this and the spanning of the continent with telephone wires will be complete and it will be possible for anyone in New York city to talk to anyone in San Francisco.

The demonstration was not only interesting in connection with the possibilities of talking between New York and Denver, but also brought out clearly the advantages of very close relations between those giving telephone and telegraph service. Those present were able to see right before them telephone and telegraph communications being carried on over the same wires at the same time. It is, of course, important that the economic advantages which would result from the general use of wires for both telephone and telegraph circuits should be attained.

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The Wireless Ship Act.

In a recent communication issued by Mr. Charles Nagel, secretary Department of Commerce and Labor, Washington, D. C., to the collectors of Customs instructions are given for the enforcement of the Wireless Ship Act which will take effect July 1.

The letter reads as follow:

"To prepare for and facilitate the enforcement of the Wireless Ship Act which will take effect on July 1, 1911, this Department has made an arrangement with the Navy Department by which naval wireless shore stations of the United States will receive during the months of May and June between the hours of 8 a. m. and 6 p. m. (time of shore station) wireless messages from merchant vessels subject to the Act, to show that such vessels are 'equipped with an efficient apparatus for radio-communication in good working order in charge of a person skilled in the use of such apparatus.' The Navy operators at shore stations will mail such messages to the Navy Department for transmission to this Department and the proper collectors of customs will then be advised. Such messages should, of course, be sent by a vessel at sea to a naval shore station at least one hundred nautical miles distant from the ship and preferably from a point which will show the average maximum radius of the ship's apparatus.

"The message should be prefaced by the words 'For Commerce Labor, Washington,' and should contain the following information: 1. Name of vessel; 2. Nationality of vessel; 3. Latitude and longitude at time of sending message; 4. Full name of operator sending message; 5. Master's signature.

"You will communicate this arrangement to the owners or agents at your port of ocean steamers subject to the Act.

"The sending of these messages is not, of course, obligatory but it is for the convenience of shipowners as well as of the Department."

Section 1 of the Wireless Ship Act of June 24, 1910, reads as follows:

> "Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the first day of July, nineteen hundred and eleven, it shall be unlawful for any ocean-going steamer of the United States, or of any foreign country, carrying passengers and carrying fifty or more persons, including passengers and crew, 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, in charge of a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages over a distance of at least one hundred miles, night or day; Provided, That the provisions of this Act shall not apply to steamers plying only between ports less than two hundred miles apart."

WIRELESS OPERATORS.

1. Paragraphs 3 and 4 of Article VI of the Service Regulations, annexed to the Berlin International Radio-telegraphic Convention, provide:

> "3. The service of the ship station must be carried on by a telegraphist holding a certificate issued by the Government to whose authority the ship is subject. This certificate testifies to the technical proficiency of the telegraphist as regards: (a) The adjustment of apparatus; (b) Transmission and sound-reading at a speed which must not fall short of 20 words a minute. "An operator 'skilled' within the meaning of the act should be able:

(a) To send on an ordinary Morse key for five consecutive minutes at not less than twenty words per minute, five letters being counted as one word. The accuracy of signaling, the correct formation of the letters, and the correctness of spacing will be taken into account;

(b) To receive and write legibly at the prescribed speed from a double headgear telephone receiver as ordinarily used for radio-telegraphic reception;

(c) To understand simple diagrams of the electrical connections of the apparatus;

(d) To be able to connect up the apparatus;

(e) To name the principal parts of the apparatus and indicate their use;

(f) To mention the most common faults, and the means usually taken to remedy them;

(g) To explain the steps taken to change from one wave-length to another, in sending and receiving.

The Berlin Convention has been ratified by the following nations and provinces: The United Kingdom and British South Africa, Germany and all German protectorates, France, Norway, Japan, the the Netherlands and Dutch Indies, Russia, Sweden, Austria-Hungary, Spain, Denmark, Belgium, Brazil, Turkey, Portugal, Roumania, Mexico, Bulgaria, Persia, and Tunis. It is to be noted that the United States is not as yet a signatory power to this convention.

Wireless operators, holding valid certificates, issued by the governments named will be recognized as persons "skilled in the use of such apparatus" within the meaning of the Act cited unless in the case of a specific individual there may be good reason to doubt the operator's skill and reliability. Such certificates should be ready at hand for the inspection of customs or other officers before the ship departs from the United States.

Mr. H. M. Heffner, chief operator of the Commercial News Department, 195 Broadway, New York, in renewing his subscription for Telegraph and Telephone Age for another year says: "It is always a pleasure to point out the necessary, entertaining and instructive features of the Age to such as are not yet initiated into the graces of a regular enrollment. I shall certainly recommend your paper at all times."

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QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. Having completely covered Mr. Jones' book we will now take up "The Quadruplex," by Maver and Davis, and bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER I.

In what year did Mr. Edison perfect the quadruplex?

Between what cities was the first quadruplex circuit established?

Upon what system was the quadruplex worked at that time?

Describe the general arrangement of the receiving instruments?

How were the instruments operated?

How were the instruments wound?

What were the principal features of the No. 2 relay?

Did it differ essentially from the present No. 2 relay?

Was the first quadruplex a complete practical success?

What was the principal difficulty of operation and what was the cause of it?

What were the first steps taken to obviate the troubles?

What was the purpose and action of the condenser?

What change in the foregoing arrangement was made in 1875?

Did the armature of the No. 2 relay respond to changes of polarity or to current strength alone?

What was the next change in the development of the quadruplex?

What is a diplex system?

Does the present quadruplex involve the diplex system?

What was the next improvement made and how were the No. 1 and No. 2 relays placed?

In this arrangement of the instruments did the No. 2 relay respond to either polarity ?

In the operation of the apparatus when does the No. 2 relay break the local circuit?

What was the next step in the placing of the two relays?

At this time a change in the position of the condenser was made; where and how was it connected?

Who devised this arrangement?

What was the function of the combination relay illustrated in Fig. 6?

Did this device work successfully and why was it found advisable to use two separate relays?

What was the character of the No. 2 relay in 1878 and how was it operated?

What was the effect of the introduction of the short-core No. 2 relay?

Has any material change been made in the continuity-preserving transmitter?

Has any change been made in the form of the pole changer?

Researches on Multiplex Telephony.*

BY ERNEST RUHMER.

Directly after my first researches on wireless telephony in the summer of 1906 I conceived the plan of combining wireless with wire telephony and in this way solving the problem of multiplex telephony. After several preliminary researches in this field I succeeded in the spring of 1908 in transmitting at the same time over the line between my laboratory and my house five separate conversations without any disturbance. These researches and those which followed were carried out with the apparatus described as follows:

In the same way as in wireless telegraphy high-frequency alternating current is generated at each transmitting station. The frequencies at the various stations are, however, different. All these high-frequency currents are propagated along the same wire and are then separated again at the receiving station, where they operate a resonance circuit connected with a telephone. The coupling between the telephone wire and the respective receiving stations must be as loose as possible in order to separate the various speeches and thus to prevent

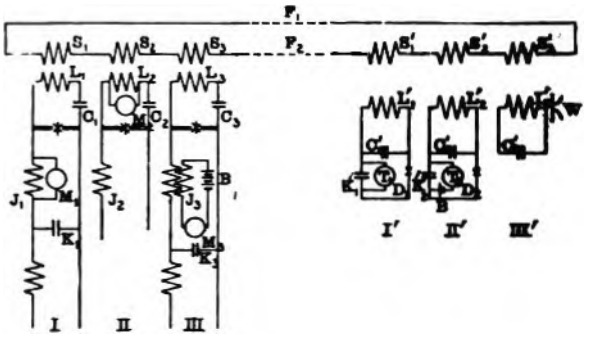

DIAGRAM OF CONNECTIONS OF RUHMER MULTIPLEX TELEPHONE STATIONS.

the troubles which arise when there is a great deal of speaking; otherwise some of the listeners cannot hear very well.

The accompanying illustration shows diagrammatically three transmitting and receiving stations arranged on this system. An arc burning in an atmosphere of hydrogen is used for generating the high-frequency current. The arc is connected in parallel with an oscillatory circuit which is fitted with a capacity (C_1, C_2, C_3) and a self-induction (L_1, L_2, L_3) so that the periods of oscillation are different.

The strength of the high-frequency current flowing in these circuits is dependent on the microphone M. Further, the main current can be regulated as in I and III, or the high-frequency current in the oscillatory circuit as in II. Any of these arrangements are permissible as long as the microphone at

*From a London Exchange.

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a given transmitting station does not influence the alternating current from the other transmitting stations.

Detectors D can either be connected with the oscillatory circuits in an analogous manner to that used in wireless telephony, or the alternations in the alternating current may be changed into sound-waves direct either by using a condenser or an eddy current telephone as at W in III'. The transfer of the different speaking currents through the common wire F_1, F_2 is effected by means of a coil, S, which is coupled fairly closely with the transmitter oscillatory circuit and loosely with the receiving circuit.

As the wire carries oscillations of all frequencies certain free oscillations occur in the circuits at the respective receiving stations, so that each receiving station only hears the conversation from the corresponding transmitting station.

The Telegraph and Telephone in Salvador.

The telegraph and telephone lines of the Republic of Salvador, Central America, are government property. The first telegraph line was built between San Salvador and the port of La Libertad in 1870 by Mr. Charles H. Willings, a telegrapher from the United States.

The submarine cable of the Central and South American Telegraph Company was laid in 1882 under the direction of Mr. Stanley MacNider, then of New York but now of Guatemala. It connects La Libertad with Salina Cruz to the north and with Panama to the south.

The telegraph was instituted in 1888 by native telegraphers under the direction of Don Teodoro Gomez. There are 2,551 miles of telegraph wire in the country, 2,074 miles of telephone wire, and 200 offices. In the year 1910, 1,540,040 telegrams were transmitted. The receipts from the telegraph service were $448,385.75; from the telephone service, $257,269.87; from the cable service, $113,512.60, making the total receipts $819,167.68.

The following named gentlemen constitute the board of directors: Director-general, Don Ricardo Posada; sub-director, Don Manuel Olmedo; inspector-general, Don Teodoro Gomez; inspectors of telephones, Don Ramón A. Cáceres and Don Manuel C. Mariona; inspectors of telegraphs, Don Francisco Corea and Don Luis Aceituno; secretary, Don M. A. Girón; cashier, Don O. Lindo; shopkeeper, Don Felipe Guzman.

The present central office not being large enough to satisfactorily accommodate the several services, the Board of Directors has arranged to buy a piece of land near by, and the engineer, Mr. José E. Alcaine, is preparing the plans for a new building.

The central office at Santa Ana was constructed in 1905 especially for the various services. In this installation were used for the first time in that country underground cables, laid in lengths of 100 meters from the office, each cable having 50 wires, paper insulated. During the first year of service these cables were troubled by atmospheric discharges. In the following years, however, lightning arresters were installed, and since then no trouble has been experienced.

A switchboard of fifty-six lines capacity, manufactured by J. H. Bunnell & Co., New York, was installed September 25, 1910, by the inspector, Don Ignacio R. Zamora, in the central office of San Salvador.

The central office of telephones of San Salvador contains four switchboards of 100 grounded lines each. There is also a multiple combination switchboard for 500 subscribers.

The Van Rysselbergh system of simultaneous telegraphy and telephony is used with good success to several points in the country that are not reached by special wires for telephone service.

Two sets of wireless telegraph apparatus have been purchased and will be installed as soon as the buildings are completed.

In order to obtain direct communication with the capitals of Guatemala and Honduras four sets of Ghegan telegraph repeaters have been ordered. The use of these repeaters will make it possible to communicate from San Salvador to Tegucigalpa, the capital of Honduras, a distance of 360 miles. Two sets of Hughes printers were recently installed on busy lines and are working satisfactorily. The director-general is forming a corps to operate these machines.

A Central American telegraph conference is soon to be held in Venezuela for the purpose of arriving at a better understanding among the five Central American republics in regard to telegraphic matters. The conference will consider, among other things, intercommunication between the various republics on a more equitable basis.

The matter upon which the foregoing article is based was supplied by Mr. Fidel Villacorta, of Sonsonate, San Salvador, who also sent us several photographs showing interior and exterior views of the telegraph and telephone headquarters in San Salvador. The telegraph operating room as shown in the photographs strikes an American as being very peculiar in its arrangement and equipment. The instrument desks resemble old-fashioned office desks, with drawers down one side and inclined tops, enclosed by a railing. The desks are placed in rows, with ample space between them. The switchboard is of the modern American type, and the room is lighted by electric arc and incandescent lamps.

The telephone switchboard is of the drop-type, male operators being employed in their handling. The view of the exterior of the headquarters show the main building to be of a substantial character and one story high. The wires are carried into the building through an elaborate frame work placed upon the roof.

China's Telegraphs.—The Chinese government has raised a loan for the development of the Chinese inland telegraphs, which are said to be the worst in the world.

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Interferences and Perturbations in Wireless Telegraphy.

Mr. J. E. Taylor recently read a paper before the Institution of Electrical Engineers, London, on the subject of "Wireless Telegraph Working in Relation to Interferences and Perturbations," from which the following extracts are taken:

The working efficiency of a radio-telegraph installation is very greatly influenced by its freedom or otherwise from interferences and perturbations of all kinds.

Interference by local inductive disturbance is avoidable. It is necessary to ensure that there is no electrical disturbance of the radio-telegraph receiver by the operation of the land circuits. Such disturbance may, in the case of Morse apparatus on the land circuit, arise from sparking at relay and key contacts, electrostatic or electromagnetic induction from circuit leads, or from battery leakage direct or via the earthing elements, and direct induction from the external line to the aerial wires of the radio-telegraph plant. To obviate these troubles, telegraph or telephone circuits are led into the station by a short length of underground cable, so that the exposed landline is at least 30 or 40 yards distant from any part of the aerial wire system of the radio-telegraph plant. The landline apparatus and wiring are located in the operating room as remote from the radio-telegraph apparatus as possible, consistent with convenience in having both sets of apparatus manipulated by one officer. The land-circuit ground connection should be made separately to a ground-plate distinct, and separated by at least a few yards, from the main high-frequency grounding system of the wireless telegraph plant.

In addition to inductive disturbance of the wireless telegraph receiver by the landline there is also the reverse action to consider, viz., the powerful electrostatic induction of the wireless transmitting plant on the landline and Morse apparatus. In the case of wireless telegraph transmitters with coupled or closed-circuit excitation, troubles of this kind are not very apt to occur; but if "plain aerial" transmission, or any form of transmission involving precharging of the aerial system prior to disruptive discharge across the spark-gap be used, strong inductive disturbances are liable to be created on neighboring circuits.

Complete isolation of running machinery from the operating-room, preferably by locating it in a separate structure, is desirable to eliminate vibration effects, and battery-charging circuits should be excluded completely from the operating-room.

The consideration of mutual disturbance produced by radio-telegraph stations on one another opens up a peculiarly involved problem. In certain tracts of sea around the British Islands where congested radio-telegraph conditions arise, it is, unfortunately, sometimes necessary, under present working arrangements, to rely largely on "shouting down" interfering stations. Although, under the International Radio-telegraph Convention, the range of wave-lengths allotted for ship to shore working is strictly limited and defined, no radical improvement in working conditions can at present be expected from any system of allotting distinctive wave-lengths for individual coast stations.

Stations in sufficiently close contiguity are liable to powerful electrostatic induction across from aerial to aerial, tending to produce forced oscillations, the effect of which on the receiver it is extremely difficult to annul. This effect decreases very rapidly with increase of distance of separation. It is more pronounced in transmitters of the open-circuit type, in which the aerial system is charged up to a high potential prior to discharge across the spark-gap. The pre-charged aerial method produces an extensive and obtrusive electrostatic field, whilst the electrostatic field produced by the coupled transmitter is negligible in comparison, and can be made wholly unobtrusive in its interference-producing qualities.

Emphasis must be placed on the disability of the station experiencing such interference at close quarters to "tune out" to the necessary extent by dissonance, assuming coupling methods and receiving appliances of the kind required for the efficient operation of a spark system.

Interference by pre-charged aerials on distant stations is also of a very pronounced character; this effect cannot, of course, be due to electrostatic induction, but is doubtless determined by the impure character of the waves emitted.

Heavily coupled transmitters give rise to interference both in respect of impurity of wave-train, due to forcing at the transmitter, and in respect of the well-known double wave emission. Lightly coupled spark transmitters have most certainly proved themselves to occupy a premier position as regards elimination of objectionable interference. For ship-and-shore communication, a very light coupling is impracticable, both by reason of the diminution of range and because, if sharp tuning is necessary, there will be a difficulty in getting into touch; calls would be lost, and the communication would lose its utility. Under present conditions of operating coast station services, there are periods during which the "jamming" of the signals of one station by others is so pronounced that confusion begets confusion, and "shouting down" becomes the order of the day.

Regulation of interference at the receiver is a very important proposition. It is unfortunate that complete elimination of disturbance by regulation of the receiving appliances is not feasible, as in that case the difficulties experienced in successfully legislating for the regulation of transmitters would not arise.

In contrast with coupling methods of reducing interference, various plans of divided circuits have been proposed or used in which the impulses conveyed by one branch are annulled by those conveyed by the other, except to the extent necessary for the interpretation of the signals required. In these methods the required signals are "turned in"

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as against tuning out undesirable impulses. Fessenden's "differential" method and S. G. Brown's "bridge" method are examples of this class.

If the two branches of the divided circuit in the bridge are absolutely symmetrical, all received impulses will divide equally and no effect will be produced on the detector (which occupies a position corresponding to the galvanometer in a Wheatstone Bridge). A very slight disturbance of the balance by shifting the point of the earth-wire connection to right or left will determine signals on the detector from the branch best tuned to the received impulses. If these impulses consist of a sufficiently long train of waves, discrimination is effected between these and any other impulses (even if of the same periodicity) if such other impulses are of a more rapidly damped character. A "valve receiver" interference preventer based on a similar principle has been patented by Marconi.

Transmitters of high sparking rates or intermittency, producing a constant musical note in the receiver, lend themselves to acoustical methods of reducing interference both by reason of the possibility of resonating acoustically to the spark frequency and by the comparative ease with which signals of high and constant periodicity can be magnified at the receiving station. This method appears to have been fully worked out by the Telefunken Company.

The phenomena known in operating parlance as "X's," otherwise parasitic impulses or "atmospherics," present a wide variety of characteristics depending upon the latitude in which they are observed, the season of the year and the time of day. They manifest themselves in the auditive wireless receiver as a series of scraping, scratching or explosive noises of various intensities. They present distinct periodic characteristics in all latitudes, being stronger, more persistent and prevalent during the summer than the winter months, whilst they also present distinct periodic variation connected with the times of rising and setting of the sun, though varying greatly in intensity and prevalence from day to day at all times of the year.

During thundery weather, atmospheric impulses are always very pronounced, and occasionally cripple the working of the coast stations in this country for several hours together or even, in exceptional cases, for a whole day. In the winter months, in this country, these disturbances are rarely strong enough to interfere seriously with traffic, whilst they are sometimes totally absent for days together.

With regard to means of reducing interference due to "atmospherics," no special devices are at present in use at the British coast stations, and it is problematical whether any entirely effective arrangement is possible, for the reason that a rough, comprehensive kind of tuning adjustment is essential at these stations for their normal receiving arrangement or "stand-by" adjustment, in order that calls on a variety of wave-lengths from ships may not be missed. For actual reception of messages, however, the sharply tuned adjustment with variable coupling can be resorted to, and the intensity of disturbance thereby much diminished. Tuning alone does not appear to be by any means a complete solution of the problem, doubtless for the reason that most, if not all, of the disturbing impulses have no specific wave-length or frequency of their own. They appear to be due to sudden changes in the electrical state of the atmosphere (probably in the higher regions), which determine sudden changes in the electrical charges normally induced on the aerial wires. The sudden release or accumulation of a charge will set the aerial system into electrical oscillation at the latter's own periodicity. Hence the futility of tuning them out. That they are reduced by tuning and weak coupling to a greater extent than signaled impulses is doubtless due to the damping factor of the aerial system, which determines a rapid rate of decay and few oscillations for the individual disturbance, whilst the signaled impulses may consist of much longer trains of oscillations.

Wireless "freak" communications are wrapped up in the phenomenon of variations in the transmitting efficiency of the atmosphere. Perturbances in this respect exhibit almost the same characteristes of irregularity as atmospheric impulses. Freak ranges of communication or variations in range of communication occasionally occur by day, but the variations noticed during the night hours are much more pronounced. The sudden veiling or obscuring of distant signals together with the equally sudden "opening out" of signals observed whilst listening on the receiver at a wireless station during the prevalence of this phenomenon is very impressive. These variations of range are not found to synchronize definitely with the periods of atmospheric disturbances, though it may well be that more disturbances are observed when the range extends. The author has, however, observed these remarkable variations in range on nights when "atmospherics" have been conspicuously absent.

A Man's Expressive Opinion of Mr. Carnegie.

A story is told of how Mr. Andrew Carnegie befriended a Texas man who had broken a leg. The man was taken to a hospital and when he was asked if he had any friends replied that he had only one genuine friend, and that was a man named Andrew Carnegie; but that he did not know where he might be reached.

Mr. Carnegie was in Scotland at the time but the facts in the case were cabled to him. He replied directing that the moneyless man be carefully nursed and doctored, and that a certain sum be placed at his disposal after leaving the hospital. When this was told to the man in the hospital, he raised himself on his arm and said:

"That's damned white of Andy." And Mr. Carnegie says that he wants nothing better on his tomb than the words, "That's damned white of Andy."

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How Faults on Telegraph Lines Are Located.*

Failures of telegraph wires may be divided into two classes—avoidable and unavoidable. It is the constant aim of an efficient maintenance force to entirely eliminate the avoidable troubles, and to reduce to a minimum the effect of the unavoidable ones by clearing them in the shortest possible time after their appearance. To assist the Plant Department's efforts in the latter direction, the engineer of equipment of the Western Union Telegraph Company, Mr. W. E. Athearn, has issued specifications which describe the installation and operation of the bridge testing set. In designing this apparatus, the principal aim has been to secure simplicity and ease of operation. With it, a wire chief can quickly determine the location of wire trouble which may develop in his territory, and thus avoid any loss of time on the part of the lineman assigned to clear it.

The apparatus required for one bridge testing set of the type covered by these specifications is as follows: One Varley bridge, consisting of 2-100 ohm balancing arms and a rheostat adjustable from 0 to 9,999 ohms, with keys, etc.; 1 jack-box, containing

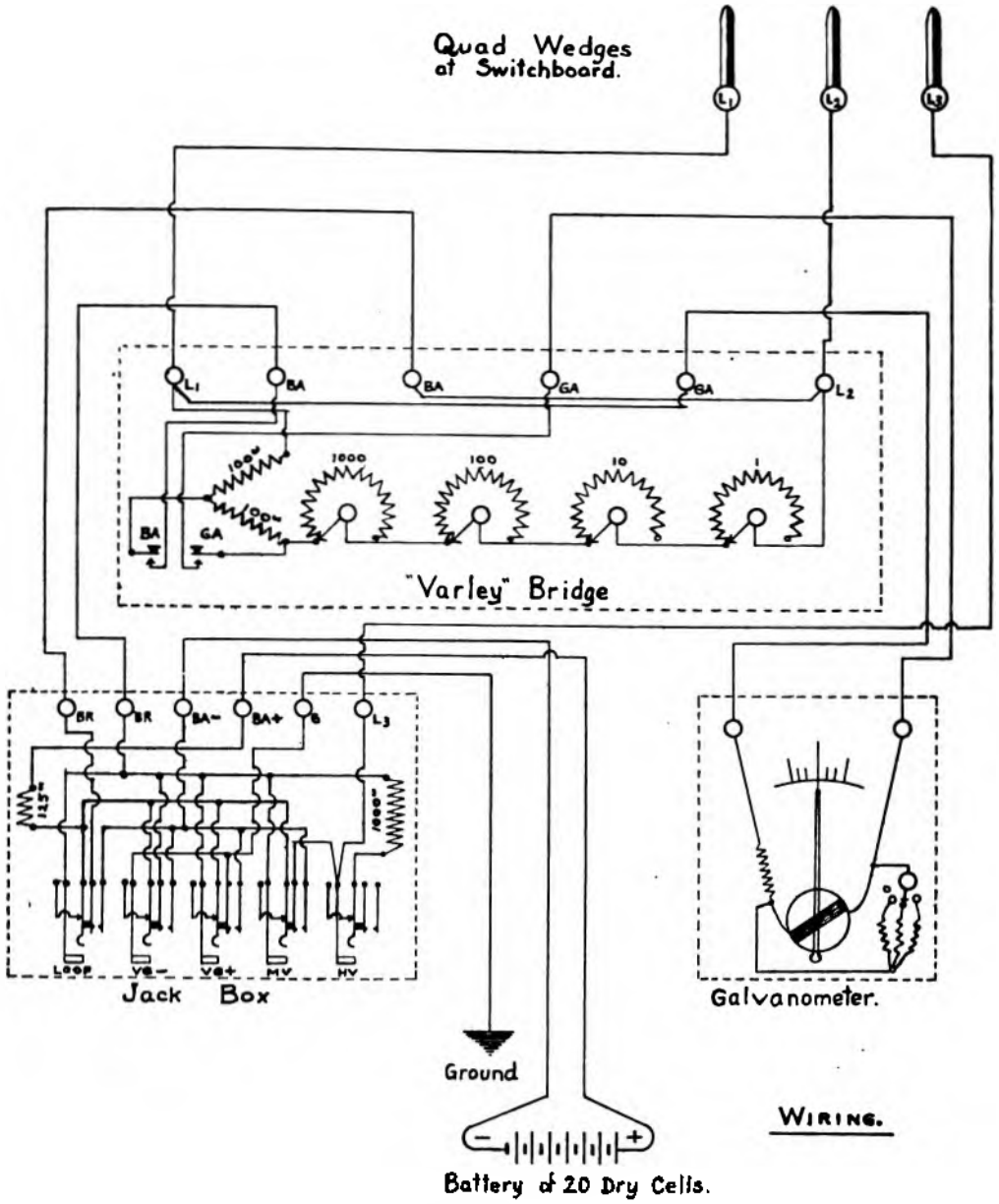

FIG. 1.—DIAGRAM OF CIRCUITS OF WIRE CHIEF'S TESTING SET.

5 W.E.-No. 120 jacks and 1-125 ohm and 1-1,000 ohm resistance units; 1 Weston galvanometer, model 14 with shunts; 3 single-conductor, 6 ft. switchboard cords with wedges marked *L*-1, *L*-2, and *L*-3 respectively; 20 cells of dry battery.

The testing set is principally intended for use by switchboard attendants, in connection with tests of overhead lines. It is a special form of Wheatstone

*Abstracted from *Journal of the Telegraph.*

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bridge, consisting essentially of two 100-ohm resistance coils, a rheostat adjustable from 0 to 9,999 ohms, and a galvanometer. The actual wiring and arrangement of apparatus is shown in Fig. 1. A simplified diagram of the connections is given in Fig. 2. In this diagram the rheostat is shown as being adjusted to 100 ohms, and the path of the currents is indicated by arrows. Starting from the battery *Ba* it will be noticed that the current divides

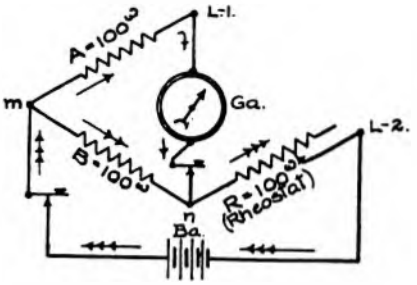

FIG. 2.—DIAGRAM OF CONNECTIONS.

at the point *m*, part of it going through the branch *A* (100 ohms) to the point *L*-1 and then through the galvanometer *Ga* to the point *n*, while the remainder goes through the branch *B* (100 ohms) to the point *n*. At *n* the two currents reunite and pass through the rheostat *R* (100 ohms in this case) to the point *L*-2 and thence back to the battery *Ba*. As the galvanometer *Ga* is simply an instrument for indicating the presence of any current passing through it by the deflection of a needle or pointer, it is evident that such a deflection will occur in this case; in fact, the deflection will be great, if the galvanometer is at all sensitive.

If we now connect a loop having a resistance of exactly 100 ohms to the points *L*-1 and *L*-2, as shown in Fig. 3, the galvanometer needle will drop to zero, indicating that no current is passing through the galvanometer. If the resistance of the loop had been 101 ohms instead of 100 ohms, the tendency of the current to flow down through the galvanometer from *L*-1 would have been slightly greater than the tendency to flow up through the galvanometer from *n* and a small deflection of the galvanometer needle would have resulted; if the loop had a resistance of 99 ohms, the tendency would have been reversed and a slight current would have passed up through the galvanometer from *n*, deflecting the needle in the opposite direction. In either of these cases, however, the galvanometer needle could have been quickly brought back to zero by readjusting the rheostat *R* to 101 or 99 ohms respectively. From this it may be seen that if the resistance of the loop referred to had been unknown, it could have been readily determined by connecting up as shown in Fig. 3 and adjusting the rheostat

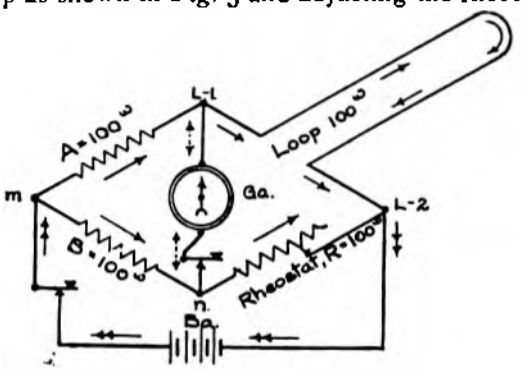

FIG. 3.—CONNECTIONS FOR LOOP TEST.

R until the galvanometer indicated a balance, i. e., until the galvanometer needle showed no deflection; the reading of the rheostat *R* would then show the resistance of the loop connected to *L*-1 and *L*-2. Of course, the unknown resistance connected to *L*-1 and *L*-2 may be anything we desire to measure—a loop, a pair of wires looped together at some distant office, or the coils of a relay or sounder, etc.

It should be noted that a variation of resistance in the battery branch of the bridge, that is, the branch between *L*-2 and *m* via *Ba*, does not affect the measurement, for while it varies the total amount of current available for the bridge, it cannot change the proportions in the branches *A*, *B*, *Ga*, *R*, etc., upon which the balancing depends. The voltage of the battery *Ba* should therefore only be high enough to give good deflections of the galvanometer and any ordinary resistance which may develop in the battery or any resistance which may be inserted in the battery branch to keep the current at a safe value, may be disregarded.

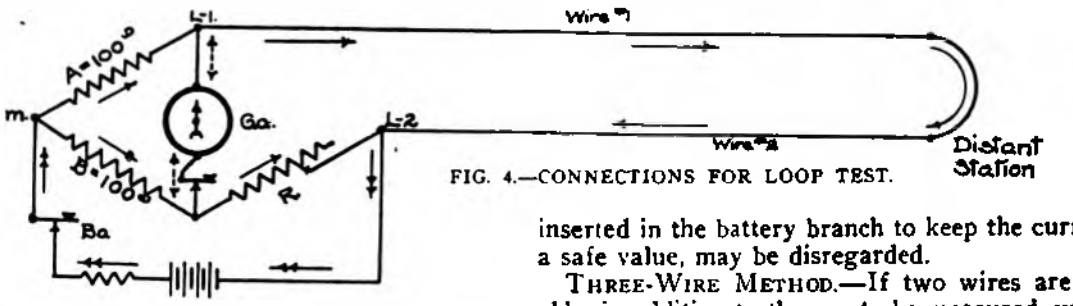

FIG. 4.—CONNECTIONS FOR LOOP TEST.

THREE-WIRE METHOD.—If two wires are available, in addition to the one to be measured, very accurate results can be obtained as follows:

Calling the wire to be measured No. 1, and the other two wires Nos. 2 and 3, have the distant station loop back wires No. 1 and No. 2. Connect these wires to the testing set at the home station by inserting the wedges *L*-1 and *L*-2 in the line springjacks at the switchboard. At the testing set, insert the connecting plug in the jack marked "Loop." The connections will now be as shown in Fig. 4.

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Adjust the rheostat *R* until the galvanometer indicates a balance, and record the rheostat reading which will be the total resistance of wires No. 1 and No. 2 in series.

Have the distant station loop back wires No. 2 and No. 3, change switchboard wedges *L*-1 and *L*-2 to these wires, and re-balance the bridge; record the new rheostat reading as the resistance of wires No. 2 and No. 3.

Now have the distant station loop back wires No. 1 and No. 3, change wedges *L*-1 and *L*-2 to these wires, and re-balance the bridge; record this rheostat reading as the resistance of wires No. 1 and No. 3.

Add the three sets of figures which have been recorded. The sum will be twice the total resistance of the three wires, since we have measured each wire twice—No. 1 in the first measurement and in the third measurement, No. 2 in the first and second, No. 3 in the second and third. We therefore divide the sum of the three sets of figures by 2, thus getting the total resistance of the three wires. From this subtract the resistance of wires No. 2 and No. 3, as obtained on the second measurement, and the result will be the resistance of wire No. 1. If it were desired to get the resistance of wire No. 2, we would subtract from the total resistance of the three wires the resistance of No. 1 and No. 3 as obtained in the third measurement; or for the resistance of wire No. 3, subtract from the total resistance of the three wires the resistance of wires No. 1 and No. 2 as obtained in the first measurement.

TWO-WIRE METHOD.—If only one wire is available, in addition to the one to be measured, the following method may be used; accurate results will be obtained with it when the insulation of the wires is good:

Have the distant station ground the two wires, which we may call No. 1 and No. 2. Connect these wires to the testing set at the home station by inserting the wedges *L*-1 and *L*-2 in the line spring jacks at the switchboard; *L*-2 should go to the wire

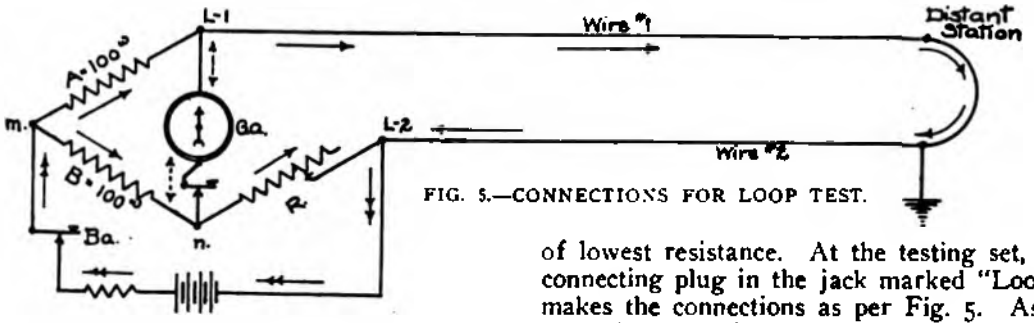

FIG. 5.—CONNECTIONS FOR LOOP TEST.

of lowest resistance. At the testing set, insert the connecting plug in the jack marked "Loop," which makes the connections as per Fig. 5. As the only ground on the circuit is the one at the distant station, it will have no effect on the balancing of the bridge; the current will pass out over one wire and return over the other, exactly as in the "Loop" measurements previously made, and a balance will be obtained when the rheostat *R* is equal to the total resistance of the two wires under test. Record this figure as the "Loop" resistance. Now transfer the plug from the "Loop" jack to the "VG+" or "VG—" jack; use the "VG+" jack if the distant ground has negative potential, and vice-versa. The connections will now be as per Fig. 6; the testing battery being grounded, the current will pass outward over both wires from the testing set and return through the ground from the distant office as shown by the arrows. A study of this drawing will show that the conditions for a balance of the bridge are now totally different from those which were shown in Fig. 5. Instead of the rheostat *R* having to equal the total resistance of wires No. 1 and No. 2 in series as it had to in Fig. 5, we are now using wire No. 2 in series with the rheostat *R* to form one arm of the bridge and thus they match against wire No. 1 which forms the opposite arm. Now if wire No. 1 has exactly the same resistance as wire No. 2, it is evident that the rheostat *R* may be set at zero and the bridge will be balanced, that is, no resistance need be added to the arm containing wire No. 2 to make it equal to the arm containing wire No. 1, as they are already equal to each other. On the other hand, if wire No. 2 has less resistance than wire No. 1, it is plain that the rheo-

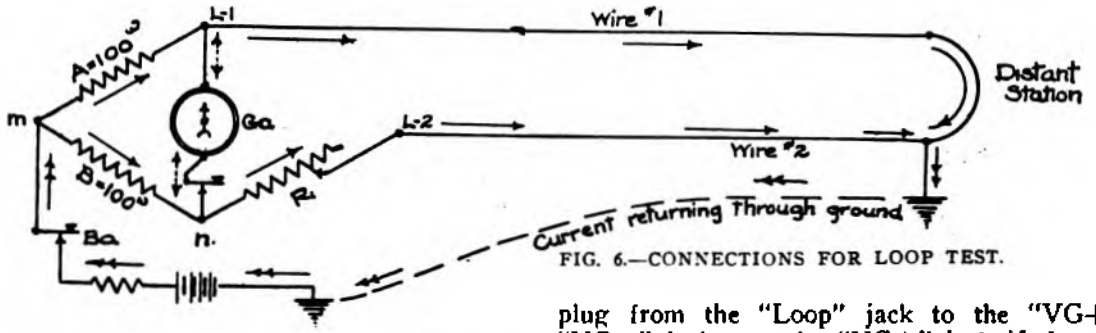

FIG. 6.—CONNECTIONS FOR LOOP TEST.

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stat R must be set at a figure which is equal to the difference between the resistances of wires No. 1 and No. 2. This is made clearer by the example shown in Fig. 7. This figure is electrically the same as Fig. 6, but is drawn with greater similarity to the usual bridge diagrams and assumed resistances for the two wires have been added. If wire No. 1 has a resistance of 150 ohms and wire No. 2 has a resistance of 100 ohms, rheostat R must be set at 50 ohms to effect a balance, as that will make the opposite arms equal at 150 ohms each. This idea of adding, by means of the rheostat R, such resistance to a wire which forms one arm of the bridge as will make it equal the resistance of the wire which forms the oposite arm of the bridge, is the basis of all "Varley" measurements. It is the principle on which practically all our locations of faults will be made.

If, in making the "Varley" test, it is found that the galvanometer indicates that a still lower resistance is required in the rheostat to effect a balance,

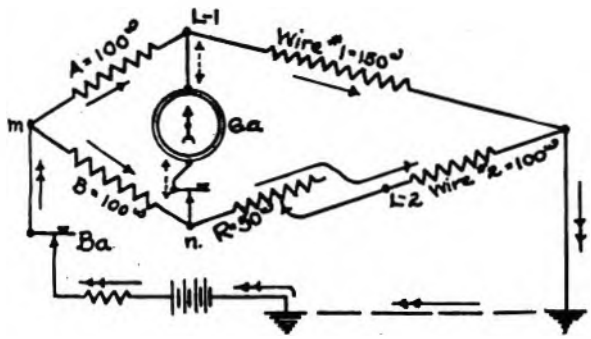

FIG. 7.—DIAGRAM SHOWING WIRES OF DIFFERENT RESISTANCES.

even when the rheostat is set at zero, this proves that the line wire of lowest resistance is connected to L-1 instead of L-2, and the wedges L-1 and L-2 must be transposed at the switchboard.

It should be remembered, in connection with the above and other "Varley" tests, that the resistance in the two ground connections (one at the testing station and the other at some distant point) has no effect on the accuracy of the measurements, for a variation in the battery branch of the circuit (of which the two ground connections form a part in this case) cannot in any way change the proportions of the balancing arms or branches, upon which the elimination of current through the galvanometer depends. For the same reason, variations of potential between the two grounds do not affect the balance.

It is scarcely necessary to say that in measuring the resistance of a wire, or in locating trouble, all relays and other apparatus should be cut out if possible. In the few cases where this cannot be done, careful allowance should be made for the extra resistance due to such instruments, and even then unsatisfactory results are quite likely to be obtained.

(To be continued.)

Banquet of Postal Telegraph Club of Atlanta.

The Postal Telegraph Club of Atlanta, Ga., held its second annual banquet at the Mechanical and Manufacturers' Club April 22, the affair proving a most enjoyable one. The banquet hall was beautifully decorated and the dinner itself was served in the style which has made the M. & M. Club famous.

District Superintendent W. C. Daviet, who was "at the board," cut in on local circuits. The Hon. John M. Slaton, president of the State Senate, made some interesting remarks. He was followed by Col. Felder, who spoke on the Law and the Telegraph, and his "pleadings" contained many anecdotes which upset the decorum of his "jury."

Dr. Turck confined his remarks to a history of the wireless telegraph, proving to his hearers' satisfaction that it must have existed in ancient Jerusalem, because recent excavations at that place had failed to show any buried poles.

Following on the bonus circuits were General Superintendent G. H. Usher, Division Superintendent J. Hargrave and Superintendents C. B. Arrington and C. H. Ashburn. Mr. Usher's talk was an excellent one. He dwelt upon the importance of loyalty to the company and to the head of the division on the part of all employes.

During the evening the proceedings were interrupted by the appearance of an excited individual (Mr. J. F. Livingston), who wished to see the Manager, and upon being introduced made a formal demand for $1,000 damages which he had lost because of the bulling of the code words "alkali" and "peninsular" in a message sent by him, the errors causing the message to read "Cannot use alcohol at price named. Can probably use it at penitentiary." After considerable argument, in which it was pointed out to the complainant how much his business was appreciated, and how gladly the company would pay the amount of the claim were it not for the fact that by so doing both complainant and manager would be likely to receive jail sentences through the medium of the Interstate Commerce Commission, by reason of the fact that that learned body would construe the settlement as a case of giving and accepting of rebates. He was finally induced to drop the matter upon his payment of the notary fees for witnessing the release signed by him, in which he not only saved the company from harm, but agreed to work for its interest and to distribute its advertising matter.

During the evening the "multiplex apparatus" was manipulated by Mr. F. J. Poundstone (violin) and Mr. C. H. Ashburn, Jr. (piano), and their performances contributed in no small degree to the evening's enjoyment.

The Postal Club of Atlanta, while only one year old, has taken its place among the prominent clubs of that city, and several letters were read from prominent citizens regretting their inability to be present. The Club has just organized a savings and investment department along the lines of the Mutual Investment Associations of New York, Chicago and Washington.

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Unveiling of the Memorial Tablet of the U. S. Military Telegraph Corps at Pittsburg.

The fiftieth anniversary of the Society of the United States Military Telegraph Corps was celebrated at Pittsburg, Pa., April 28, by the unveiling of a bronze tablet at the Soldiers and Sailors Memorial Hall in that city in memory of forty-three volunteers from Allegheny County, Pa., who served in that Corps during the Civil War. Judge Charles F. McKenna, chairman of the Memorial Hall Tablet Committee, who presided, delivered a brief but very interesting address, which was followed by the invocation by Rev. Dr. Thomas N. Boyle, vice-president of the Memorial Hall Committee.

After the singing of "America" by the audience Comrade Joseph W. Boyd gave an account of the inception of the tablet. The idea first came to him during the early part of 1907 while corresponding with Mr. David Homer Bates, secretary and treasurer of the United States Military Telegraph Corps, relative to Mr. Bates' book, "Lincoln in the Telegraph Office." While in Washington in the spring of 1908 the idea occurred to Mr. Boyd of commemorating the enlistment of all the volunteers from Allegheny County by preparing a bronze tablet in honor of Mr. Andrew Carnegie, founder of the United States Military Telegraph Corps.

He referred to the valuable assistance rendered to the project by Mr. Bates. "To the comrades who have been spared to witness the unveiling of this Military Telegraphers' Tablet," he said in conclusion, "it is a source of congratulation. To the speaker and all members of the Corps who have contributed their labor of love in bringing about this happy consummation it will ever be cherished as a delightful memory."

Mr. David Homer Bates, secretary of the society, then made the presentation address. He briefly sketched Mr. Andrew Carnegie's career as an operator and his entrance into the military service during the Civil War, afterwards being appointed, at the age of 26, assistant general manager of military railroads and telegraphs under Colonel Thomas A. Scott. The four operators who responded to Mr. Carnegie's call for volunteers for war service were Samuel M. Brown and David Homer Bates from Pittsburg, David Strouse from Mifflin, Pa., and Richard O'Brien from Greensburg, Pa. All four arrived in Washington about April 28, 1861. Brown and Strouse are dead.

So far as known there were forty-three telegraphers in all from Allegheny County, Pa., who entered the government telegraph service, twenty-five of whom are dead. Ten of the survivors are present to witness the unveiling of this tablet to commemorate the United States Military Telegraph Corps from Allegheny County. Mr. Carnegie generously offered to pay the entire cost of the tablet. The first as well as the last members of the Corps in actual service were from Allegheny County, Pa., namely, Mr. Andrew Carnegie and Bennett R. Bates, who resigned in June, 1869.

In the Civil War the Morse telegraph was for the first time employed to direct widely separated armies and move them in unison, and the history of that war was largely recorded by the telegraph.

Mr. Bates then quoted from Secretary Stanton's annual report of 1863, in which he compliments the telegraph corps for diligence and devotion to duty; also from General Grant's memoirs referring to the telegraph service in a like appreciative manner. The tablet will be, he believes, the first public memorial in honor of the Corps and in recognition of its service. This Corps, he stated, is one of the few branches of the service that has ever at any time been specially mentioned by name in acts of Congress and yet, strange to say, Congress has denied the few survivors pension rights.

Reference was then made to Mr. Carnegie's generous grant of a private soldiers' pension to needy telegraph comrades. Later Mr. Carnegie extended his bounty to the widows of comrades who died subsequently to December 16, 1907. The executive committee of the United States Military Telegraph Corps has up to the present time approved in all 121 applications for these pensions, including 21 widows.

Five of the military telegraphers from Allegheny County were captured and incarcerated in Confederate prisons, four of them dying in imprisonment.

Mr. Bates gave a brief history of the United States Military Telegraph Corps, and closed with these words: "This emblem in its superb setting will serve as a reminder to this generation and to posterity of the youthful zeal and faithful service of a special corps of 1,800 telegraphers who responded to their country's call in its hour of need, and ninety per cent. of whom have already answered their last roll call."

The beautiful tablet was then unveiled by Miss Virginia Moreland, daughter of Mr. Theodore E. Moreland, one of the Pittsburg survivors.

On behalf of the Memorial Hall Committee the tablet was accepted by Mr. William J. Patterson, of Pittsburg, president of that committee, who stated in his address that the mural tablets to be placed on the walls of the Memorial building will contain about 30,000 names of Allegheny County soldiers who went forth to the war. "The Military Telegraph Corps," he said, "held an important place in the movements of our armies. One of our own honored citizens was the first to recognize the need of such service. Andrew Carnegie was the originator and the organizer of this corps. He was appointed fifty years ago as assistant general manager of Military Railroads and Telegraph Lines. When the commander of an army wanted skilled mechanics or experts in

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any branch of the service he sent down along the line to discover and have them detailed. In this way many private soldiers who were familiar with the Morse key found themselves assigned to the Military Telegraph Corps.

"From Sumter to Appomatox," he continued, "while the Union armies were battling for the right, the electrical wires of this Corps played an important part. When the glad tidings of peace flashed over the land and the veterans of the war with happy hearts were homeward bound no body of men marched with a prouder conscience of having done their full duty to the government than the still youthful members of the United States Military Telegraph Corps."

Mr. William R. Plum, historian of the Corps, then delivered an eloquent address. "We are happily gathered," he said, "to commemorate in hallowing memory some of those whom we revere; comrades whose names are here perpetuated, in the hope of inspiring future generations to patriotic endeavor.

"This tablet is not an ephemeral memento," he continued, "for though our immortal Webster said that 'the record of illustrious actions is most safely deposited in the universal remembrance of mankind,' yet in all ages men have sought bronze reminders, that such remembrance might not die.'

He compared the names on the tablet to a constellation in the heavens. "Let us," he continued, "contemplate the constellation grouped on this tablet. First in order, by reason of his limited service, perhaps not of the first magnitude, we rejoice to name Andrew Carnegie, whose genius for organization and almost unerring judgment of men impelled Colonel Thomas A. Scott to name him to initiate the service, that in its marvelous development compelled a like department in all of the armies of the world. Ours," he said, "might be called the Military Corps of Intelligence."

Mr. Plum then referred to the first four telegraphers who answered Mr. Carnegie's call for volunteers, and spoke of them in complimentary terms. He then directed his attention to the others whose names appear on the tablet and reviewed their lives and their achievements in the service of their country. Speaking of T. B. A. David, Mr. Plum said: "To him and Captain W. G. Fuller is given the credit of constructing the first telegraph line as an army advanced to battle."

"Fifty years," said the speaker in closing, "is a long time in one's span of life. Long enough to hallow memories of that epochal period when this constellation, now as a whole near its nadir, was in its zenith of splendid usefulness buoyant with brightest hope, risking all and at times giving all."

An address by Mr. Richard O'Brien, of Scranton, Pa., one of the first four operators, was read by Mr. Charles W. Jaques, of Ashtabula, Ohio, one of the Pittsburg survivors. Mr. O'Brien referred to his early war experiences, and paid a high compliment to the other members of the corps from Allegheny County. "I was with them at the front," Mr. O'Brien said in conclusion, "and on the battlefields of Virginia and North Carolina from the first to the close of the war and I can truthfully say I do not believe the world has ever produced a braver, more faithful or more efficient body of men than the boys of the United States Military Telegraph Corps, of which Mr Andrew Carnegie was the founder."

Mr. Carnegie was then introduced by the chairman, Judge McKenna. He told how he journeyed to the capital in April, 1861, a few days after Fort Sumter was surrendered to the enemy. "The Baltimore sympathizers," he said, "had destroyed the railroad bridges over the Bush, Gunpowder and Patuxent rivers, and I was compelled to go by boat to Annapolis and thence by railroad to Washington, riding on the locomotive. While near Annapolis Junction I saw that the telegraph wire was broken and jumped down to fix it. The wire had been pulled back and tied to the pole and in releasing it the tension caused it to swing up and strike me across the face, causing it to bleed profusely so that when I reached Washington depot my face was still bloody. I have always contended that after the two soldiers who were killed in the Baltimore riots one week before I was the third man to shed his blood in the civil war."

Mr. Carnegie then told of his dispatch to Superintendent McCargo of the Pennsylvania Railroad, directing him to send operators to Washington, which brought Strouse, Brown, Bates and O'Brien within a few days, followed by Wilson, Crouse, Snyder and others, and that from this small beginning grew the United States Military Telegraph Corps, which rendered such important and valuable service to the country. "I do not think there is a member of this corps alive today," he added, "who is not a proud and happy man to know that he served his country so well in its need."

A letter was read from Mr. Robert T. Lincoln, of Chicago, expressing regret at his inability to be present at the unveiling ceremonies.

After the singing of "Hail, Columbia," and the benediction by Rev. Thomas N. Boyle, D.D., vice-president of the Memorial Hall Committee, the exercises were brought to a close.

An illustration of the tablet appeared in our issue of May 1.

Mr. R. C. Bliss, manager of the Western Union Telegraph Company, Cincinnati, Ohio, writes: "I have been a reader of your paper for a number of years and it is always a welcome guest. I wish it the success it deserves."

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The Telephone.

Henry M. Watson, until recently president of the Bell Telephone Company of Buffalo, N. Y., died at Watkins, N. Y., April 21. He became associated in the telephone business with Mr. Edward J. Hall in November, 1878. Mr. Watson was born May 13, 1839.

Mr. Frank B. Knight, an old time telegrapher and now special agent and head of the publicity department of the Southwestern Telephone and Telegraph Company, at Dallas, Tex., is the author of an interesting paper read at a recent meeting of the Telephone Society in that city. The paper was entitled "Early Reminiscences of the Telephone."

Mr. F. R. Mott, formerly general superintendent of the Bell Telephone Company of Missouri, St. Louis, Mo., and lately associated with the Duplex Metals Company, New York, has been appointed general manager of the Bell Telephone Company of Missouri, with headquarters at St. Louis, taking the place of Mr. Francis L. Gilman, who was general manager of both the Missouri and Kansas Telephone Company and the Bell Telephone Company of Missouri.

Steel Rails for Telephone Poles.—Old steel rails have been used as poles in the construction of the telephone line along the Panama Railroad. The rails are embedded in concrete, and it is stated that this form of construction gives excellent results in that climate.

American Telephone and Telegraph Stocks in Paris.—It is stated that an influential banking syndicate headed by the Banques de Paris et des Pays-Bas is backing the movement for the listing of shares of the Amercian Telephone and Telegraph Company on the Paris Bourse.

Independent Telephony in Chicago. — Judge Kohlsaat in the United States Circuit Court at Chicago has authorized the receivers of the Interstate Independent Telephone and Telegraph Company to enter into a traffic agreement with the Illinois Tunnel Company. The agreement will give the independent company an entrance into Chicago.

Telephones in Paris.—There are in the city of Paris 500,000 telephone subscribers and seven or more large central exchanges, besides numerous branch exchanges. Each exchange has two sets of storage batteries which operate the lines at 24 volts, the batteries being used alternately. Nearly all of the cables in the Paris system are run through the sewers of the city. Compressed air is used in searching for leaks and faults in the insulation of the paper insulated cables, all of the exchanges being connected to the pipes of a private company which furnishes them with compressed air. The trouble man examines the cables for the hissing noise caused by a leak in the insulation as the air escapes from the cable. A scheme is now being developed to use compressed air in giving notice automatically of leaks in any part of the cables.

New Automatic Telephone Equipment.—Mr. Charles S. Winston read a paper at the Pacific Coast meeting of the American Institute of Electrical Engineers, at Los Angeles, Cal., April 25-28, in which he described some new automatic telephone equipment. The company he represents has been developing automatic apparatus which, it is said, will meet all of the requirements of automatic, automatic-distributing and semi-automatic systems. The five switches described do the same work as is done by the Strowger switch, but in a radically different manner.

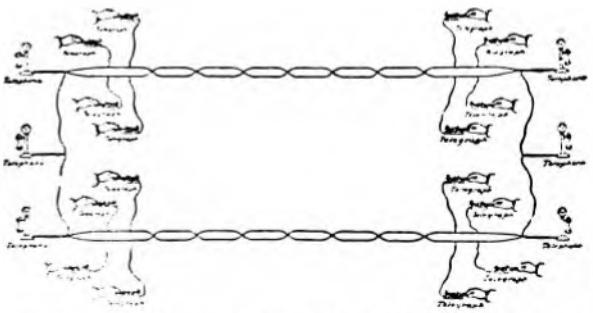
Physical Telephone Connections.

A measure legalizing the merger or lease of telephone corporations and providing for compulsory physical connection, has become law in Michigan. The bill provides that physical connection shall only ensue after an application has been made to the State Railroad Commission by the people of a given locality for such connection.

The bill which was introduced in the lower house of the Tennessee legislature providing for physical connection for long distance telephone service has been defeated.

Simultaneous Telephony and Telegraphy.

The accompanying diagram, which is reproduced from the annual report of Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, New York, is extremely interesting in



SIMULTANEOUS TELEPHONY AND TELEGRAPHY.

that it shows, in principle, how two telephone circuits are employed daily between New York and Chicago in carrying three telephone conversations and eight telegraph messages simultaneously without interference with one another.

It will be seen that the basis of the system consists of two metallic circuits. These two pairs are bridged by telephone connections at each city in such a manner as to give a third telephone circuit, each of the original circuits constituting one side of

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the third, or phantom circuit. Each of the original circuits is quadrupled for telegraph operation, as shown. The transposition of the wires is a very important feature of such a system, and this is well emphasized in the illustration.

The Telephone Pioneers' Organization.

It has been decided to extend the service time limit of applicants to membership in the proposed Telephone Pioneers' Association to and including 1890. The original limit placed upon applications was 1885.

Among the new names added to the list of pioneers are Mr. F. E. Kinsman, of New York, 1876; Mr. George C. Maynard, Washington, D. C., 1876; Mr. Thomas A. Watson, Braintree, Mass., 1875, and Mr. W. H. Baker, New York, July, 1886.

Those who entered the service prior to and including 1890 will be classed as "pioneers" in the new organization, and those who came afterwards will probably be known as "associates."

Henry M. Watson, one of the pioneers, died at Watkins, N. Y., April 21.

Radio-Telegraphy.

Wireless Station at Saigon.—A wireless station is being established at Saigon in French Indo-China which will enable this French Colony to communicate with Singapore, Batavia and Manila. The plant, it is stated, will cost about $75,000. It will have a radius of about 2,500 miles.

An Early Wireless Telegraph.

An old-time telegrapher, now residing in Central America, sends us the following interesting story of an incident that occurred at Aspinwall, now Colon, on the morning of April 15, 1857. He reached Aspinwall on the U. S. Mail Steamship *Illinois* and when the vessel was yet about 100 yards from the pier, on which many persons were waiting for the steamer to tie up, he sent what he claims was probably the first wireless message.

"My brother, who was then operator at Aspinwall," he says, "was among the crowd on the pier and as soon as I was sure that he could detect the movements of my arms as I stood by the ship's rail, I applied my right hand to the rail and in good Morse told him all about the trip of the steamer, that we had left New York two days behind schedule time in consequence of bad weather and had not called at Kingston, Jamaica, but had stopped at Port Royal where the health officer told us to proceed on our journey because we had not a clean bill of health to present. The truth was we had 200 United States soldiers on board bound for San Francisco and that was enough to produce forty unclean bills of health in Kingston.

"How well I remember," he continues, "the excitement my message created on the pier when my brother repeated it. I doubt if Mr. Marconi did more."

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.]

(41) Q. Is there any relation between the dimensions of a wireless telegraph antenna and its radiating capacity? R. C.

A. Yes, and a very definite one. The electrostatic capacity of an aerial is measured by the charge required to raise its potential one unit. An increase in the capacity enables more energy to be accumulated in the antenna and consequently greater radiation results. The capacity of an aerial may be increased by adding wires, but there is a limit to which the increase may be carried.

(42) Q. When a gravity cell is exhausted is it possible to restore its chemical activity by sending a current through it in a reverse direction? J.

A. Yes, it is possible, but not practicable. If a current be sent backward through the cell the zinc in the sulphate solution will be deposited in metallic form upon the zinc electrode; copper will be dissolved to form the blue solution, and apparently the cell is restored to its original operative condition. A cell cannot be restored in this way economically.

(43). Q. The electromotive force of a storage cell is two volts or more. How is it that two plates of lead in the same solution can produce a difference of potential? I have always understood that in order to produce a difference of potential it was necessary to use electrodes of different materials, but in the storage cell only one material—lead—is used for the electrodes. Please explain. T. C.

A. In the case of a storage battery the difference of potential is not produced by the lead plates, but between the lead peroxide on one plate and spongy lead on the other. These conditions of the plates are the result of passing a current of electricity from an outside source through the cell. No current at all would result from immersing two plates of lead in the acid solution, but by altering their physical condition, as we do by passing a current through them we create the necessary conditions to produce a difference of potential.

(44) Q. Please give me the rule to find the resistance of copper wire such as is now used in line building, its cross section being known. P. G. M.

A. Divide the length of the wire by its cross section in circular mils and multiply by 10.79. Expressed in formula this rule is

$$R = \frac{L}{C.M.} \times 10.79$$

where L = Length of wire
C.M. = Diameter in circular mils
R = Resistance.

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The Railroad.

Mr. W. H. Potter superintendent of telegraph of the Southern Railway, Washington, D. C., was a recent New York visitor.

Mr. Benj. F. Thompson, telephone inspector Baltimore & Ohio Railroad Company, Baltimore, Md., was a recent New York visitor.

Mr. B. A. Kaiser has been placed in entire charge of the railway service of the commercial department of the American Telephone and Telegraph Company, with headquarters in New York.

Extension of Telephone Dispatching on C. B. & Q.—The Chicago, Burlington & Quincy Railroad is equipping a circuit for telephone train dispatching between Kansas City and Napier, Mo., a distance of 96 miles. When this installation is completed this road will have telephone dispatching equipment on 2,700 miles of track.

Telephone-Dispatching on the Central Vermont.—Telephones have supplanted the telegraph for train dispatching on the Central Vermont Railway between St. Albans and Windsor, Vt., a distance of 150 miles. Thirty-eight way stations on this division have been equipped with selectors and telephone sets. Two portable sets have also been provided for the wreckers on this road.

Investigating Selectors.—Mr. J. C. Johnson, superintendent of telegraph of the Pennsylvania Railroad Company, Philadelphia, Pa., recently appointed a committee to investigate the operation of the different selector systems used in train despatching service. The committee's investigations were conducted from an educational standpoint only and not for the purpose of passing upon the merits of the different systems.

Telephone Train Dispatching on the "Katy" Line.

Within a short time, the Missouri, Kansas and Texas Railroad will be using the telephone to dispatch trains on both its Fort Worth and its Dallas divisions. The Dallas division runs from Dennison to Hillsboro via Dallas, a distance of 172 miles, and has a branch line of 22 miles from Dallas to Lewisville. On this division, selector equipment for twenty-nine stations will be used. The dispatcher will be located at Dennison. The Fort Worth division extends from Dennison to Hillsboro, a distance of 152 miles, with a branch nine miles long extending from Egan to Cleborne. It will be equipped with selectors and telephone apparatus for twenty stations. The dispatcher for this division will also be located at Dennison.

Telephone Despatching on the Lehigh Valley Railroad.—In view of the rapid extension of train despatching telephone lines on the Lehigh Valley Railroad, that company is installing portable telephones and line poles on all cabooses and baggage cars, the same to be used in case of emergency or accident, enabling the train crew to get into immediate touch with the train despatcher.

This installation will require about 550 telephones and line poles. The apparatus consists of a telephone enclosed in a portable box, the transmitter and receiver being in one piece. A generator also is furnished so that in case the train line should be out of order the apparatus can be used on any of the other telephone circuits on the poles.

A blue print showing the exact location of the telephone lines on the poles accompanies each portable telephone with specific instructions as to how to use the apparatus.

W. M. Hayes, Superintendent of Telegraph, Pere Marquette Railroad, Detroit, Mich.

Mr. William M. Hayes, recently appointed to the position of superintendent of telegraph of the Pere Marquette Railroad Company, at Detroit, Mich., which was announced in our issue of May 1, was born at Saginaw, Mich., March 31, 1877, and began his business career November 1, 1892, on the road of which he is now superintendent of telegraph. His service has been continuous on this system. He began as operator and agent and became successively stenographer to the general manager, secretary to the general superintendent and finally chief clerk in the superintendent's office in the Grand Rapids district, occupying the latter position at the time of his recent appointment.

Postponement of Convention of Railway Telegraph Superintendents.

The next annual convention of the Association of Railway Telegraph Superintendents which was scheduled to take place in Boston, June 19-23, has been postponed for one week, the new dates set being June 26-30. The postponement was brought about primarily because some of the prominent active members of the Association could not be present at the time originally set, including Chairman G. A. Cellar of the High Tension Crossing Committee, who will present an elaborate report on the committee's investigations during the year. Many of the associate members also found that it would be impossible to attend. The executive committee therefore recommended a postponement for one week and submitted the question to the members by letter ballot. The result of the vote was in favor of the change.

Following is a partial list of the papers to be read at the convention: "Development of Telephones for Train Dispatching and Other Railway Purposes," by Mr. G. K. Heyer, of New York; "Co-operation Between Railroad People and the Commercial Companies," by Mr. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line, Wilmington, N. C.; "Economy of the Telephone in Railway Service," by Mr. M. E. Launbranch, Chicago, Ill.; "Here Are Some Hints," by Mr. W. J. Camp, electrical engineer, Canadian Pacific Railway Company's telegraph, Montreal. The committee on High Tension Crossings, of which Mr. G. A. Cellar, superintendent of telegraph Pennsylvania Lines west of Pittsburg, is

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chairman, will make its report and submit revised specifications. The headquarters will be at the Hotel Brunswick, where ample space will be provided for exhibits. Mr. P. W. Drew, Room 306, 112 West Adams Street, Chicago, Ill., is secretary of the Association, and will be glad to give any further details regarding the convention.

The Railway Telegraph Department.*

BY JOHN A. KICK.

The means of communication in connection with railway operation is organized under the name of telegraph department, although this department has charge of both telephone and telegraph service. For train dispatching, the telephone is fast supplanting the telegraph and for other service is slowly but surely coming into favor.

A number of the trunk lines now have telephone service between their operating headquarters and the more important terminals, with prospects of extending the service over the entire system.

The progressive railway management has come to view the telegraph department as one which must be of very high efficiency, although this view has not always prevailed on account of the department being classed as non-revenue paying. It can be demonstrated that first-class service on the telephone and telegraph circuits of a railway system is a source of revenue by saving to the company freight and passenger traffic which must be secured in competition where prompt quoting of rates and routings as well as ticket and sleeping car arrangements and reservations must be made by telegraph or telephone.

A prominent business man recently called at a trunk line ticket office and made inquiry concerning tickets and reservations to a point which would mean transfer from one depot to another at an intermediate point. He remarked that he had always taken a competitive line for this trip, as he could get off at the intermediate station, arrange for his reservations for the outgoing train from the same depot, and then feel safe to go about the town until train time. The ticket agent asked details of the intended trip, turned to his telephone, called the intermediate station, arranged sleeping car reservation direct with the line beyond, and gave the patron his car and berth number, all in less time than it requires to tell the story. The gain to the railway company was the price of a ticket and the good will of a pleased patron who freely expressed his surprise and satisfaction with the marvelous service. The ticket arrangement was made with a point about four hundred miles distant and its success was dependent on first-class service, and should be entered as a credit on the telegraph department ledger.

There is an agreement between railways whereby each road agrees to pay so much per car per day for all foreign cars on its lines; also agreeing as to the proper point of delivery for cars en route to home line. When a foreign car is unloaded a telegram or telephone message is sent to the contracting department, asking for "home route" directions, and upon the prompt handling of these requests and answers depends the termination of the per diem charges. Delays in handling this class of business mean loss of money, which could be placed to the credit side of an efficient telegraph department; and so it runs through all departments which are receiving telephone and telegraph service.

There are no known means to put the railway telegraph department actually on an income basis, as its greatest value is in giving free service to all other departments in such full measure as to be effective to the extent desired by the writer of the telegram or the user of the telephone.

The good condition of the telegraph department of a railway is of the utmost importance, as it is the means whereby the commanding general reaches his field generals in planning and directing the movements of his army of men. The telephone is one of the most important utilities of the progressive railway organization, as by its use the directing members of the organization may confer at any time as well as reach any part of the system personally to direct their subordinate officers. The telephone is superior to the telegraph for general railway service, as it is instantaneous; does not require education or practice to handle; answers are received directly, allowing further questions and answers, or a number of questions and answers are exchanged on one telephone call which might require a series of telegrams extending over several days; and this service extends to the bedside of almost every railway official in the country.

Railway operation is being brought within more scientific lines; each year special men are being employed, departments in some cases entirely reorganized, antiquated methods discarded for the modern, and in general the "good old days" are fast becoming memories only. Engineering skill has been gradually drawn into railway work and with all other departments specialized and in a high state of efficiency, the telegraph and telephone service must be of the highest order, and it is for this reason that the telephone has become so popular in that service.

The telephone system of the larger terminals is of incalculable service and I doubt the possibility of satisfactorily handling some of our present day freight terminals without the service which results from having telephones placed at every advantageous point—including fifty to a hundred telephone stations in a single yard. A number of the railways have adopted the grounded telephone line as a means of station to station manual block, and others have gone still further and extended a telephone connection to all outlying siding switches; others have placed means

*From *Telephone Engineer.*

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of telephone connection with the dispatching circuit at intervals not exceeding two miles.

The telephone and telegraph department under capable management and with the financial aid and encouragement of the general executives must and will develop with the other departments, providing a saving sufficient to represent an acceptable return on the investment.

The Turner Monument Fund.

The Turner Monument Fund has passed the $1,500 mark, which amount is half of the total required to defray the cost of the proposed monument. The first half having been secured, the second half should be comparatively easy to get. There are hundreds and probably thousands who have not yet been approached on the subject and no doubt they will be glad to contribute toward the object of this movement. Everyone connected with the railway and telegraph service should be represented financially in this work. It certainly will be an honor to be thus identified with it. The committee has done much hard work and will do more yet to advertise the project and collect the funds, and theirs is a labor of love.

It is desired that other plans for the monument be submitted; any one is free to enter the contest. The committee having the matter in charge will soon hold a meeting to pass upon plans, etc., and it is hoped that those with ideas will present them.

The monument is to commemorate the sending of the first train order by telegraph, which took place at Turner, N. Y., in the fall of 1851. The author of this historical train order was Charles Minot, general superintendent of the Erie Railroad, and his name has passed into history as one of the progressive spirits of his time.

The following named gentlemen constitute the committee in charge of the monument fund: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

The contributions toward the fund received up to date are as follows: Previously acknowledged, $1,377.75. F. S. Gannon, $5.00; Martin Quick, $1.00; H. M. Clawson, $1.00; F. G. Braunlich, $1.00; A. N. Pryor, $1.00; F. W. Hachner, 50 cents; A. N. Dugan, $1.00, New York; C. E. McCluer, Norfolk, Va., $1.00; C. T. Ford, superintendent of the Harriman estate, Central Valley, N. Y., contributions from 145 employes of the Harriman estate, Harriman, N. Y., $155. Total, $1,544.25.

Trade Notes.

Match Folders. — Salesmen of the Kellogg Switchboard and Supply Company, Chicago, are distributing match folders which are proving an attraction to smokers. Each match is labeled with the name of an apparatus type. The folders come in small colored leather cases and can be obtained only from salesmen as the government postal regulations prohibits their being mailed.

Kerite Company Acquires a Western Wire Concern.—Mr. R. D. Brixey, president of the Kerite Insulated Wire and Cable Company, 30 Church St., New York, announces that his company has acquired the interests of the Watson Insulated Wire Company and established a western office in the Peoples Gas Building, Chicago. Mr. B. L. Winchell, Jr., formerly vice-president of the Watson Insulated Wire Company, has been appointed western sales manager of the Kerite interests.

Electrical Supplies Wanted for Navy. — Proposals will be received at the Bureau of Supplies and Accounts, Navy Department, Washington, D. C., until May 19 for a quantity of magnet wire and watertight vibrating bells (schedule 3515), to be furnished at the Navy Yard, Brooklyn, N. Y. Bids will also be received until May 23 at the same place for portable testing sets and watertight bells (schedule 3524) to be delivered at the Navy Yard, Mare Island, Cal. Address T. J. Cowie, Paymaster General, U. S. N., Washington, D. C.

Non-Paying Offices in Baltimore Hotel.—The Maryland Public Service Commission has been asked to compel the Western Union and Postal Telegraph Companies to reopen their offices in a Baltimore hotel, which were discontinued because they were non-paying.

Lecture on Telegraphy.—Mr. R. C. Bliss, manager of the Western Union Telegraph office at Cincinnati, Ohio, gave an address on "Telegraphy, its Invention and Development" at a recent meeting of the Men's League and Woman's Auxiliary of the Walnut Hills Baptist Church, Cincinnati.

Wire Tappers Arrested.—A prominent society man and a contractor of Philadelphia caused the arrest in New York on May 6 of thirteen men, some of whom are said by the police to be the most notorious wire tappers and confidence men in the United States. In order to bring about the arrest of these men, Mr. McDonald came to New York and associated constantly with crooks, who expected to get a lump sum of from $20,000 to $30,000 from him.

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Dinner of Commercial Managers' Association of Greater New York.

The regular monthly dinner of the Commercial Managers' Association of Greater New York, of the Western Union Telegraph Company, was held at the "Carlos," New York, May 3, and was the most enjoyable and successful dinner ever held by the association. It was unique in the fact that for the first time the branch office lady managers were invited to participate.

Mr. P. J. Casey, president, made an excellent toastmaster, and his introductions of the speakers were happy and in a manner entirely original. Seated with him at the guest table were Mr. A. G. Saylor, general superintendent, Eastern Division; intendent; Mr. A. C. Kaufman, commercial agent; Mr. John A. Hill, division traffic superintendent; Mr. B. H. Reynolds, superintendent of the Central and South American Cable Company; Mr. J. F. Nathan, commercial superintendent; and Mr. John Simmonds, district commercial manager.

During the dinner an orchestra rendered excellent music. Mr. Joseph N. Matier, of the Central Cable Office, enlivened the evening by a number of comic songs.

At the conclusion of the dinner, and before the speaking began, an intermission of fifteen minutes was arranged so that all present could have an opportunity to visit and renew old acquaintance. During this period, Mr. Saylor and Mr. Mulford held an impromptu reception and every person in the room greeted them.

President Casey introduced Mr. J. F. Nathan, who, in responding, said it would sound too conventional and formal were he to address those present as other than friends. He complimented them on their fidelity, zeal and loyalty, and dwelt on the good derived from social intercourse, harmony and co-operation. He pointed out managers employed within a short distance of each other who had for the first time met that evening. Mr. Nathan closed his remarks by inviting all when in trouble or doubt to call on him at his office.

The next speaker, Mr. A. C. Kaufman, commercial agent of the Eastern Division, spoke on "Commercialism," and urged that all working together could and would accomplish the goal set for Greater New York, that they were near it and that all that was necessary was a determination to win or die. He complimented those present and considered it a privilege to have the opportunity of addressing them.

Mr. B. H. Reynolds followed Mr. Kaufman, and in an able and forcible address expressed his ideas of the duties of the telegraph employe, taking as a basis for his remarks his twenty years' experience with the Western Union.

President Casey, in introducing the guest of honor, Mr. A. G. Saylor, referred to him as the friend of the manager, the operator and the messenger, whose geniality and fairness well fitted him for the position he occupies.

Mr. Saylor, by his kindly manner, won the esteem of everyone present from the start. He said he was going to take all into his confidence. When accepting the invitation to be present, he supposed it was to be a meeting of the district commercial managers. The large number present somewhat abashed him, but he was going to stick to his guns.

After some reminiscences as to his experience as a branch office manager, Mr. Saylor took up the subject of organization, comparing the territorial with the functional features, pointing out the advantages of the latter. His discourse was entertaining and instructive. Mr. Saylor and Mr. Mulford were unanimously elected members of the association.

Among those present, in addition to those mentioned at the guests' table, were:

From Brooklyn: M. J. Hayden, J. E. Shields, J. J. McCaffrey, Joseph Goldstein, H. Lupka, P. I. McGowan, C. A. Harvey, A. D. Shaw, J. McNeil, W. F. Alcock, Miss F. Rosenblume, Miss A. E. Gardiner, Miss A. R. Ward, Miss E. Egan, Miss A. B. Lyons, Miss E. Koch, Miss F. Samsony, Miss H. A. Samsony.

From the Bronx: John T. Carberry, J. P. McGovern, J. Lauerman, Miss A. G. Burns.

From Manhattan: J. W. McMahon, J. J. McGrath, M. Russnow, M. E. Pierce, L. E. Westrope, R. Raphael, L. Silberstein, F. R. Anson, P. E. Grogan, Miss Hills, Mrs. Curtiss, Miss McEvily, Miss O'Donnell, Miss Reed, Miss Wall, Miss Brennon, F. Spree, F. J. Nielan, A. J. Burton, L. Ribler, W. H. Megie, W. Badgley, Miss M. Kircher, Miss M. Browman, P. Kinmon, N. W. Jacobs, N. Goldman, J. Cummings, R. J. Nimmons, N. Feder, Miss N. C. Loughlin, Miss K. T. Donohue, Miss M. L. Hayes, Miss M. E. Saunders, Miss Loughran, George F. Smith, Miss Benson, F. J. Lantry, Charles F. Seelman, P. J. Sullivan, M. M. Greene, William Levy, Miss Hoff, Miss Pollak, W. Hermann, Fred. Bollman, Miss Sadie Greenwald, James A. Berry, Martin J. Brooks, James Felsenheld, J. J. Riley, Albert Lister, B. F. Benson, A. Disney, E. G. Hohenstein, V. M. Sozzi, J. Cashman, J. Veitch, J. Cahill, J. Fleming, W. A. Schudt, J. Lee, J. Matier, H. F. White, A. Simon, T. F. Hull, J. S. Bradbury, A. Guthrie, Miss Sultan, Miss Scully, Miss Van Vliet, Miss Morrissey, Miss Donohue, C. B. McCann, A. K. Ainlay, J. J. Shelley, O. L. Whiteneck, D. Drew, M. P. Vrabel, B. Liebowitz, E. S. Clark, William J. Ackerley, Thomas T. Parr, D. Fuchs.

Omaha Telephone Exchange.—The Omaha *Bee* of April 30 published an interesting full-page description of the development of the telephone, with particular reference to the Omaha exchange. It contains illustrations of Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, and the now historical picture showing the opening of the New York-Chicago line with Prof. Alexander Graham Bell at the instrument, besides news of the Omaha exchange operating room.

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Obituary.

George W. Canfield, aged 84 years, died at Hornell, N. Y., April 23.

Frank Kisselburgh, aged 55 years, an operator at Rensselaer, N. Y., died April 28. Mr. Kisselburgh was the operator who sent the message announcing the death of General U. S. Grant at Mount MacGregor.

Richard D. Holmes, aged 73 years, who was connected with the Western Union Telegraph Company in a clerical capacity at Pittsburg, Pa., for the past 40 years, died at his home in that city April 9. Mr. Holmes was a Civil War veteran.

A. D. Holcomb, aged 30 years, for many years in the service of the Postal Telegraph-Cable Company at Atlanta, Ga., died in that city May 5. Mr. Holcomb was a telegraph engineer of considerable ability and was an associate member of the American Institute of Electrical Engineers.

Jesse H. Robinson, a well-known old timer and a military telegrapher, died in Washington, D. C., May 1, at the age of 67 years. Mr. Robinson had been in charge of the telegraph division of the Weather Bureau at Washington for thirty-four years. He worked in Pittsburg before going to Washington and was a co-worker with Mr. Andrew Carnegie at that point. Mr. Robinson enlisted in the United States Military Telegraph Corps in 1863, and at the close of the war constructed portions of the overland telegraph line which was intended to connect this country with Europe by the way of Alaska and Siberia. He was located in Siberia for two years in connection with this work. He entered the signal corps of the army in 1872 and was assigned to the weather bureau service. This is the fourteenth death among military telegraphers since the Chicago reunion last September.

Annual Meeting of The Associated Press.

The annual meeting of the Associated Press was held at the Waldorf-Astoria, New York, April 25 and 26, with a large attendance from all parts of the country.

Messrs. Frank B. Noyes, of the Washington Star; Adolph S. Ochs, New York Times; W. L. McLean, Philadelphia Bulletin; W. R. Nelson, Kansas City Star, and A. C. Weiss, Duluth Herald, were re-elected directors, and Mr. W. H. Coles, of the Spokane Spokesman-Review was elected to succeed the late Harvey W. Scott.

The Board of Directors re-elected the present officers, as follows:

President, Frank B. Noyes, Washington Star; first vice-president, R. M. Johnston, Houston Post; second vice-president, Frank P. MacLennan, Topeka (Kan.) State Journal; secretary and general manager, Melville E. Stone, New York; treasurer, J. R. Youatt, New York.

General Manager Melville E. Stone in his report refers to the new Canadian press service which was inaugurated January 1 last, and which was referred to in detail in this publication at the time. The experiment of sending news by telephone in sections of the West, he states, is successful.

New Book on the Telephone.

Telephonology, by H. R. Van Deventer, is one of the latest and best books published on the telephone and on account of its practical character will appeal to all engaged in telephone work. The book is divided into sixteen chapters upon the following subjects; first principles; talking equipment; signaling equipment; commercial talking equipment; magneto instruments and circuits; magneto switchboards; selective and lock-out systems; batteries; testing telephone parts; testing equipment and fault location; measuring instruments and their uses; common battery equipment; harmonic party line systems; line and cable construction; the automatic system; composite systems and wireless telephony.

The author very wisely refrains from attempting to give any history of the development of the telephone, but after a brief discussion of the general subject of telephony, devotes the remainder of his book to describing apparatus, systems and methods in common use at the present time.

The chapter upon composite systems is probably the best and most concise exposition of this question of such importance at the present time to both telegraph and telephone people that has ever been produced, being, in fact, the first general discussion of this subject which has ever appeared in any work on telephony. This chapter is well illustrated with circuit diagrams, showing the various combinations of apparatus which can be used to secure composite and phantom circuits. These are but a few of the many points contained therein which make the work a valuable one to the engineer or student. Copies of Telephonology may be obtained by addressing Telegraph and Telephone Age, 253 Broadway, New York. Price $4.00.

An Interesting Message in Morse's Handwriting.—Among a lot of old telegrams in the possession of Mr. F. J. Scherrer, New York, is one written by Prof. S. F. B. Morse for transmission. It is addressed to a firm in New York and reads "I will call for frame when next in the city." The peculiar feature of the message is a drawing of a human skull in the lower left hand corner of the sheet to indicate that the message is "deadhead." This message was sent on October 28, 1857, from Poughkeepsie, N. Y., by Mr. Henry A. Reed who was manager of that office at that time and is now president of the Bishop Gutta Percha Company, New York.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

The funeral services of A. E. Sink, formerly and for many years manager of the operating department, which occurred on April 24, were attended by over one hundred members of the staff of this office.

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Mrs. E. M. Curtis has been appointed manager of the newly opened office in the Hotel Martinique.

Mr. J. E. Shields, formerly of the office of the superintendent of the Long Island Railroad, has been appointed manager of the Brooklyn office, vice William Porr, resigned.

Mr. M. J. Hayden, formerly manager of the Brooklyn office, has been appointed district commercial manager in Brooklyn.

Mrs. S. J. Kirschbaum, recently of the Norwich, Conn., office, has been appointed manager of the Grand Union Hotel office, New York.

Mr. Charles E. Shelly, formerly of Albany, N. Y., has been appointed solicitor at 195 Broadway, New York.

Mr. L. F. Badgley, of the general operating department, has been appointed solicitor at 854 Broadway, New York.

PHILADELPHIA, WESTERN UNION.

Mr. A. H. Poody, a full-blooded Indian graduate of the Carlisle Indian School, who learned telegraphy at Carlisle, has been given a place on the night force in this office.

PHILADELPHIA, POSTAL.

Traffic chief M. N. Redding has resumed his duties after a long absence occasioned by the deaths of his mother, aunt and his wife's mother, all of which occurred within five weeks.

Mr. E. B. Pillsbury, general superintendent, New York, was a recent visitor.

The loss of our supply of current due to the fire at the Philadelphia Electric Company's station early on the morning of May 6 caused considerable anxiety for a time, but Chief Operator E. W. Miller, assisted by Mr. William Fitzgerald, straightened things out by arranging to get a supply from a neighboring building until the electric company restored its service late in the evening.

Philadelphia Electrical Aid Society Entertainment.

The Electrical Aid Society of the City of Philadelphia held its eleventh annual entertainment, banquet and dance on April 26. The affair was very successful and enjoyable and was largely attended. Mr. Andrew Weir, past president of the Society, was presented with a loving cup by the members in token of his faithful service during his incumbency as president from 1906 to 1910. The presentation speech was made by Mr. William C. Ash, principal of the Philadelphia Trades School, No. 1. The membership of the Society is composed of about 1,100 employes of the electrical bureau, the Western Union and Postal Telegraph companies, the Bell and Keystone Telephone companies and the Automatic Signal service of the Pennsylvania Railroad and the Reading Railroad. Col. Green, a forty-niner of the telegraph and now retired, was the guest of honor. He was accompanied by his daughter. The officers of the Society are: President, William R. Harmstad; vice-president, A. G. Strickland; recording secretary, William E. Vanarsdall; financial secretary, R. C. Murray; treasurer, J. H. Wilson. Mr. Charles A. Huyer was chairman and Mr. Richard H. Conway secretary of the entertainment committee.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

Martin's Double Lever **VIBROPLEX**, $8.00 f. o. b. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

WANTED.—Live agents in all large Western Union and Postal offices. Central Typewriter Exchange, New York.

Among sound and reliable insurance organizations the Telegraphers' Mutual Benefit Association of 195 Broadway, New York, occupies a foremost place. Organized in 1867, it has paid to beneficiaries of deceased members $1,500,000. Reserve Fund, $327,000, the largest Reserve in proportion to liabilities that is held by any similar Association. All persons engaged in Telegraph or Telephone service between the ages of 18 and 45 are eligible for membership, no restrictions after admission as to change of occupation or residence. The lowest possible cost consistent with security offered. Write for blanks and further information.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEY BOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

Rubber Telegraph Key Knobs.

No operator who has had to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. They render the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 10. NEW YORK, JUNE 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

"Grief," or the Stress of Discipline; Its Source and Remedy.

BY WILLIS H. JONES.

Some time ago a former chief operator gave "grief" as his excuse for leaving the telegraph service, meaning the mental anguish caused by what might be called the stress of discipline. To a certain extent the excuse given seems justifiable. The "grief" is certainly great where negligence, indifference or incapacity exists, but on the other hand the fact should be more generally appreciated that where duty is faithfully, intelligently and honestly performed, though the task utterly fails to produce successful results, the "stress" is seldom applied. Unfortunately, however, the majority of good men of this type do not always stop to consider this fact and thus become unnerved through fear of unlikely consequences.

Now a certain number of rules and regulations are obviously necessary in any business undertaking in order that the manager's desired method of operation may be intelligently carried out by his subordinates. Unfortunately, however, these, what may be termed first instructions, while usually sufficient in scope and direction to insure satisfactory results when faithfully carried out, have to be eventually so amended and amplified in order to infuse ambition, if not actual fear, in the hearts of the ever present weaker and indifferent element, that even the faithful cannot entirely escape the resulting general "stress" thus unavoidably and perhaps reluctantly imposed upon all alike for the company's own protection.

The original source of "grief," then, should not be very difficult to trace, for the preponderance of evidence shows plainly that severe strictures are, in nearly every case, the direct result of mistakes, incapacity, or some other weakness on the part of one or more employes themselves.

When we begin to analyze the factors which contribute to this end we immediately encounter a phase of the question not generally taken into consideration, but which probably leads as directly to the eventual issuing of stringent rules as anything else. At the same time it discloses a very fertile field for educational development along a new line and which suggests the real subject matter of this article. We refer to the somewhat reprehensible spirit often displayed by the unwise in their mutual business dealings with one another. In other words, to a lack of frankness and deference to the intelligence of the man at "the other end of the wire," or with whom one may be temporarily conversing or colaboring.

This unfortunate attitude is not taken solely by those engaged in the telegraph service, but is common, to a greater or lesser degree, in all classes of workers engaged in service which subjects them to a continuous mental strain.

Now while the "mental strain" explains, in many cases, the source, or rather the tendency to be unfair, it should not be accepted as an excuse or a license to act in such a manner.

In the correction or mastery of this trouble-breeding tendency lies the true method of avoiding the penalties of our own making. A few illustrations will show how we unwittingly bring about conditions that leave the company no alternative other than to inaugurate a set of rules so explicit in detail that we experience "grief" in their very number.

Probably one of the most frequently occurring tactics pursued by employes too generally is that of disclaiming responsibility for unlocated "trouble" by attempting to place the fault at the other end of the circuit. This tendency is particularly true where the trouble mysteriously disappears while each attendant is trying to find the source of it. Naturally in a case of this kind each at first imagines the other found it but would not

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admit the fact. After several recurring experiences of this kind lack of confidence in each other's sincerity is born, and discourtesy often results from unwise and usually unwarranted accusations. Distance tends to make one brave in speech, hence when two excitable persons allow themselves to digress from legitimate duty to personal abuse, each becomes a bar, instead of an aid, to the other, and the service suffers thereby. In time knowledge of the habit and its consequences reaches the manager's ears and a drastic order is issued which holds both parties responsible for the location of the fault. Then, the belligerents for their own protection get together and aid one another in eliminating the disturbing element, while rebelliously doing what might just as well be done cheerfully at first.

Distance and the absence of convicting witnesses often tempt some not overscrupulous persons in branch offices and way stations to deny having a ground wire on when caught napping after having used the same temporarily without authority and then forgotten to remove it. When such a ground connection has been made at a nearby station and suddenly lifts when a request is made for the operator at that point to try the circuit it is useless for him to deny an accusation, for the reason that both the simultaneous restoration of stations beyond him and the greatly diminished volume of current resulting from the thereby lengthened conductor is almost positive evidence of guilt.

The average way-station operator is not usually aware of this conclusive evidence, hence his conscience rests easy until a complaint comes up and the wire chief at the main office states the facts. The latter's version is usually accepted. Wire chiefs are thus often misled in their tests by prevarications of this kind, especially when the unauthorized "ground" is so distant as not to give conclusive evidence as to its location.

Another source of lack of effective co-operation between employes in large offices sometimes is discourtesy in speech and treatment, and the strangest part of it is that the persons apparently the most discourteous during business transactions, are often the most courteous at other times and our best friends. This spirit is particularly displayed by wire chiefs. In most cases it is not only unintentional, but the offender is at the time really unconscious of his demeanor. When such a person is straining every nerve to untangle a mess of crossed and broken circuits and a traffic chief comes along with a report of further interruption, perhaps while the wire man is in the midst of a half-completed order to a lineman, he really feels at the moment that he is being imposed upon and snaps out an answer that he would never acknowledge in his tranquil frame of mind. The result of this apparent discourtesy tends to cause traffic chiefs to delay reporting interruptions which require immediate attention, and he takes a chance that the trouble will disappear later. In this way the company is again the sufferer and cause is again given for tightening the reins.

Another thing that gives results directly opposite to that intended is the withholding of necessary information on the part of a senior chief concerning the details of one's particular branch of work, under the erroneous impression that by so doing he will enhance the position and render his personal services indispensable. No greater mistake can be made than to pursue such a policy. On the contrary the man who willingly and voluntarily endeavors to uplift his weaker brother by freely imparting information which acts to his employer's advantage comes the nearest of all to rendering his own services indispensable, as the manager readily recognizes the fact that in addition to getting first class legitimate service out of such a man the company is also deriving the benefit of free instructions for its employes without the requirement of additional compensation.

It would seem then that the rules which bring us "grief" are after all of our own making and principally due to the acts of our weaker co-laborers whom we should endeavor to uplift instead of decrying as is too often the case.

Recent Telegraph and Telephone Patents

ISSUED MAY 2.

990,972. Telephone Call Distinguisher. To K. W. Gale, Los Angeles, Cal.

991,234. Telegraphy. To I. Kitsee, Philadelphia, Pa.

991,260. Automatic Telephone System. To V. Alexeeff, Ensell, Persia.

991,325. Telegraphic Relay. To I. Kitsee, Philadelphia, Pa.

ISSUED MAY 9.

991,583. Bell Desk Instrument. To C. L. Williams, Parkersburg, W. Va.

991,654. Telephone Exchange System. To N. C. Schellenger, Chicago, Ill.

991,672. Printing Telegraph. To G. S. Tiffany, Summit, N. J.

991,829. Electrical Relay. To E. E. Clement, Washington, D. C.

991,837. Wireless Signaling System. To S. Eisenstein, Berlin, Germany.

991,928. Telephonic Relay System. To C. G. Ashley, Chicago, Ill.

992,042. Wireless Telegraphic Apparatus. To M. A. Parisano, New York.

The following patents have expired:

518,959. Telephone. Issued to E. V. Kolbassieff, Cronstadt, Russia.

519,346. Apparatus for Telegraphic or Telephone Transmission. Issued to M. I. Pupin, New York.

519,347. Transformer for Telegraphic, Telephonic or other Electrical Systems. Issued to M. I. Pupin, New York.

519,876. Telephone Circuit. Issued to C. E. Scribner, Chicago, Ill.

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Personal.

Prof. Alexander Graham Bell has returned from a trip around the world.

Major Joseph Orton Kerbey, of Washington, D. C., an old-time and military telegrapher and ex-consul to Brazil, sailed from New York for Brazil on May 27.

Mr. Andrew Carnegie and Mr. Frank Munsey, proprietor of *Munsey's Magazine*, both old-time telegraphers, recently sailed from New York for Europe.

Mr. G. K. Heyer, of New York, delivered an address before the Central Railway Club, Buffalo, N. Y., on May 12, on "Train-Dispatching by Telephone."

Mr. B. M. Downs, vice-president of the Brookfield Glass Company, New York, has returned from a business trip which took him to the Pacific Coast.

Mr. G. L. Lang, formerly superintendent of telegraph of the Queen & Crescent and now living in retirement at Chattanooga, Tenn., was a recent New York visitor, and made it the occasion to call on many of his old friends.

Mr. M. Musgrave, superintendent of telegraph, United Fruit Company, whose headquarters have been at New Orleans, La., for some time past, is located at New York, which point he may possibly make his permanent headquarters.

Grace J. Johnston, widow of the late W. J. Johnston, for many years proprietor of the *Electrical World* and an old-time New York telegrapher, was married in New York on May 16 to Mr. William McCarroll, public service commissioner of Brooklyn.

Mr. F. W. Jones, former electrical engineer of the Postal Telegraph-Cable Company, New York, and Mrs. Jones, have returned from West Palm Beach, Fla., where they have been spending the winter. They are now residing at Spring Valley, N. Y.

Mr. George M. Myers, an old-time telegrapher and now a prominent citizen of Kansas City, Mo., is president of the Kansas City Aero Club. He, with two other men, made a balloon trip recently from Kansas City, landing at a place twenty miles away. Mr. Myers enjoyed the trip very much and is very enthusiastic over his experience.

Mr. George H. Thomas, the Democratic nominee for mayor of Portland, Ore., was formerly a telegraph operator. At one time he occupied the positions of chief operator and manager of the Western Union Portland office. He is a brother of Mr. Percy Thomas, of the Hearst newspapers, and president of the New York local Commercial Telegraphers Union of America.

Mr. David Homer Bates, secretary of the United States Military Telegraph Corps, New York, is lecturing under the management of the J. B. Pond Lyceum Bureau, New York, on "Personal Reminiscences of Lincoln in the Telegraph Office During the Civil War." It is an intensely interesting narrative of the exciting times of that period and Mr. Bates makes it all the more attractive by the use of illustrations.

Mr. Gano Dunn, a former telegrapher and now vice-president and chief engineer of the Crocker-Wheeler Company of Ampere, N. J., has been elected president of the American Institute of Electrical Engineers. Mr. Dunn is an electrical engineer of high standing and prominence and has an international professional reputation. A biographical sketch of him was published in our issue of February 1.

Canadian Notes.

Common Carriers in Canada.—A bill has been introduced in the Canadian House of Commons to amend the railway act in order to include telephone, telegraph and express companies and require them to make statements of business and operation to the railway board.

Connection Between Competing Telephone Companies in Canada.—Compulsory physical connection of competing telephone lines is to be tested in the province of Ontario. The Dominion Railway Board has ruled that nine independent telephone companies are to be permitted to connect with the long distance lines of the Bell Telephone Company of Canada during a period of one year. If, at the expiration of that time, the plan has been found to be unsuccessful, it will be abandoned. If, on the contrary, it has been found to work to the advantage of the companies and the public, it will undoubtedly be extended in its scope.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. C. Adams, vice-president, and Mr. F. F. Norton, superintendent of traffic, have returned from a brief western trip of inspection, which included Cleveland, Buffalo, etc.

Mr. S. M. English, general manager of the Postal Telegraph-Cable Company of Texas, was a recent New York visitor.

Mr. M. M. Davis, electrical engineer of the company, has returned from a business trip which took him to Buffalo, Chicago, St. Louis and Pittsburg in the interest of the service.

Mr. T. J. Donovan, formerly manager at 239 Greenwich Street, has been transferred to 30 Church Street as manager, vice Mr. J. J. McDermott, who takes the place of Mr. Donovan at 239 Greenwich Street.

Mr. C. H. Jett, chief operator of the Denver, Col., office, has organized an electrical class among the studiously-inclined members of his force. The class meets at his residence and much progress in electrical matters is being made.

The Postal Company has opened new and up-to-date offices at North Adams, Mass., and Geneva, N. Y.

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Mr. Fred Arrington Bivins, whose appointment as manager at Montgomery, Ala., was noted in our columns May 16, was born at Alligator, Miss., January 2, 1887, and entered the telegraph service on the Yazoo and Mississippi Valley Railroad in July, 1902. He afterwards went with the Postal Company and worked as operator at Greenville, Miss., and Memphis, Tenn. In March, 1908, he was appointed manager at Greenville and was in October, 1909, transferred to the managership at Jackson, Miss., which position he held at the time of his recent appointment to be head of the Montgomery office.

Story of Postal Telegraph and Commercial Cable Companies.—The *New York Herald* of Sunday, May 21, printed a two-page illustrated article entitled "The Mackay System's Romance of Success." It is the story of the rise and magnitude of the Postal Telegraph-Cable Company and the Commercial Cable Company, and is written in an interesting style. Among the illustrations are portraits of Mr. Clarence H. Mackay, president, and Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. W. E. Athearn, engineer of equipment, has returned after an inspection trip throughout the West. He went as far as Omaha and was accompanied by Mr. F. E. D'Hume of his staff.

Mr. W. L. Vatter, of the engineering department of the American Telephone and Telegraph Company, has been appointed division supervisor of equipment for this company, with headquarters at New York.

Mr. C. H. Carroll, district commercial agent of the fourth district, Southern Division, has been appointed district commercial manager, with headquarters at Louisville, Ky.

Mr. Frank L. Titus, manager of the Reno, Nev., office, has been advanced to a position in the district commercial department at Los Angeles, Cal. Mr. L. L. Nolton, manager of the Goldfield, Nev., office, succeeds Mr. Titus as manager at Reno.

Mr. W. R. Edmondson, district commercial agent of the fourth district, Southern Division, has been appointed district commercial manager with headquarters at Jackson, Miss. Mr. Edmondson will be in charge of all independent offices in the state of Mississippi, reporting direct to Superintendent J. R. Terhune at Nashville, Tenn.

Mr. F. C. Dowd, an old-time telegrapher and a member of the bar, at Boston, Mass., has recently been attached to the commercial department at New York.

Mr. E. R. Shinn has been appointed to a position in the office of Mr. H. E. Roberts, purchasing agent, New York. Mr. Shinn is a practical printer and will have charge of the printing, stationery, etc.

Mr. J. W. Atkins, manager of the Key West, Fla., office, was a recent New York visitor. Mr. Atkins is a brother of Mr. G. W. E. Atkins, vice-president of the company.

Mr. J. M. Ball, has been appointed manager at Middlesboro, Ky., vice Mr. J. B. Campbell, resigned.

Mr. J. W. Miles has been appointed manager at Johnson City, Tenn., vice Mr. J. H. Clark, resigned.

Mr. L. C. Flora has been appointed manager at Corinth, Miss., vice Mr. F. G. Goodman, resigned.

The Commercial Managers' Association of Greater New York will hold its next dinner at the St. Denis Hotel, New York, on the evening of June 7. Mr. Belvidere Brooks, general manager of the company, will be the guest of honor. This dinner will be the last one of the spring season; the meetings will be resumed in the fall.

A meeting of Western Union managers of Southern New York and Northeastern Pennsylvania was held at the Hotel Radington, Wilkesbarre, Pa., May 10. Those present were: E. M. Mulford, division commercial superintendent, A. C. Kaufman, division commercial agent, and W. A. Sawyer, district commercial superintendent, New York; Richard O'Brien, district traffic manager, G. R. Daniels, district commercial manager, and W. H. Collins, district plant chief, Scranton, Pa.; A. Woodle, district commercial manager, Syracuse, N. Y., and the following named managers: W. H. Peterson, Scranton, Pa.; E. F. Cowell, Wilkesbarre, Pa.; H. L. Hilton, Allentown, Pa.; S. G. Smith, Williamsport, Pa.; C. B. Slawter, Easton, Pa.; C. E. Coleman, Bethlehem, Pa.; Fred Rau, South Bethlehem, Pa.; A. E. Shuman, Hazleton, Pa.; H. W. Deitterick, Bloomsburg, Pa.; A. L. Davenport, Plymouth, Pa.; J. B. Scureman, Nanticoke, Pa.; A. H. Krum, Ithaca, N. Y.; J. J. Brickweddie, Elmira, N. Y.; H. F. Horton, Binghamton, N. Y.; R. T. Harris, chief operator, Scranton, Pa.; E. M. Holland, chief operator, Wilkesbarre, Pa.; David Edwards, chief operator, Plymouth, Pa.; A. E. Deleven, cashier, Syracuse, N. Y.

This company has opened a new and up-to-date office in Miami, Fla. Mr. W. H. McDonald is manager. The new equipment is much appreciated by the patrons of the company.

The Cable.

Mr. F. G. Burstall, assistant superintendent at the Hazel Hill, Canso, N. S., station of the Commercial Cable Company, is in charge at that point during the prolonged absence of Superintendent F. B. Gerrard, assigned to duties in the executive offices at New York.

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. The Government has decided to secure the control of cable rates through the licenses necessary

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to the landing of the cables on British shores. The licenses come up for renewal periodically and henceforth on such occasions the Government will oppose such rates as it may think excessive. If the company disagrees the question will then be arbitrated.

Cable Telegraphy.—At a meeting of the Royal Colonial Institute in London, on April 25, Mr. Charles Bright read a paper on "Imperial Telegraphs." Mr. Bright's lecture was largely occupied with the question of a cable system for the empire, exclusively under British control.

German Transoceanic Cables.

In the past seventeen years six submarine telegraph cables with a total length of 21,748 miles have been laid by German capital. The Deutsche-Atlantische Telegraphengesellschaft, of Cologne, is the most important cable company in Germany and owns the lines between Emden and Vigo, 1,284 miles, and the two cables between Emden, Horta and New York, 4,770 and 4,916 miles respectively. The latest German cable laid is the German-Brazilian line which belongs to the Deutsch-Suedamerikanische Telegraphengesellschaft. The last section of this cable, between Monrovia and Pernambuco, was laid a few months ago and reference made to it in these columns recently. The cable starts at Emden and stations are located at Santa Cruz de Teneriffe and at Monrovia. To further improve the service it is proposed to erect a wireless station at Monrovia.

Municipal Electricians.

Fire Alarm.—A patent, 991,903, on a fire alarm has been granted to Mr. Frank Simonyi of New York.

Fire Alarm System in Trinidad, Col.—Eighteen Gamewell street fire-alarm boxes are to be installed in Trinidad, Col.

Electric Fire Alarm.—Mr. A. C. Farley, of Shinglehouse, Pa., has been granted a patent on an electric fire alarm. It depends for its operation upon the expansion of metals by heat.

Telephones for Fresno Fire Department.—A private telephone system for the exclusive use of the Fresno fire department, Fresno, Cal., is to be installed by the Pacific Telephone and Telegraph Company and a branch exchange will be located at fire headquarters.

Municipal Electricians.—We have received from Mr. C. R. George, secretary of the International Association of Municipal Electricians, Houston, Tex., a copy of the membership list of that association. According to the list there are 117 members. The next annual convention of the association will be held at St. Paul, Minn., September 12, 13, 14 and 15 at the Ryan Hotel, and a large and enthusiastic gathering is expected. Several matters and papers of importance to municipal electricians will come up for consideration, and from the outlook the meeting will be one of the largest and most successful ever held by that organization. Secretary George will be glad to give any further information regarding the meeting.

Charles H. Murphy, General Superintendent of Time Service, Western Union Telegraph Company, New York.

Mr. C. H. Murphy, who has been appointed general superintendent of time service of the Western Union Telegraph Company, New York, was born at South Lebanon, Ohio, May 6, 1872. Mr. Murphy entered the company's service in September, 1889, and served about three years in the construction department. In December, 1892, he took up the time service work at Chicago and two weeks later was assigned a territory in Iowa,

C. H. MURPHY,
General Superintendent Time Service, New York.

with headquarters at Cedar Rapids. On January 1, 1896, he was transferred to Denver, Col., as time service inspector for the western part of the Third District, and on September 1, 1898, became manager of the time service at Omaha, Neb., for the entire Third District of the Western Division.

In May, 1902, Mr. Murphy was called to New York to assume the managership of the Time Service Department for the Eastern Division, which position he has successfully filled until his recent appointment.

Mr. Murphy has a thorough and comprehensive knowledge of time service matters and is eminently well qualified to discharge the duties of his new position.

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The Telephone.

Mr. F. H. Bethell has been elected a director of the New York Telephone Company to succeed Henry M. Watson, deceased.

Mr. W. A. Blanchard, special agent of the American Telephone and Telegraph Company, New York, has returned to New York after completion of service studies in the larger cities of the east.

Mr. E. J. Hall, vice-president of the American Telephone and Telegraph Company, who has been spending a few weeks in Watkins, N. Y., for rest and recuperation, has returned to his desk much improved in health.

Mr. Henry W. Pope, special agent of the American Telephone and Telegraph Company, New York, is absent on a tour taking in Colorado and New Mexico and is expected to return in the course of a month or six weeks.

Mr. S. G. McMeen, the well-known telephone engineer of Chicago, addressed the students of the Throop Polytechnic Institute, Pasadena, Cal., recently on "The Work of the Telephone Engineer." Mr. McMeen has recently completed the installation of an automatic telephone system in San Francisco.

Mr. Angus S. Hibbard, former second vice-president and general manager of the Chicago Telephone Company, who is to occupy a position on the staff of Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company in New York, was the guest of honor at several going-away parties prior to his leaving Chicago. The Wisconsin Society of Chicago presented him with a meat dish, explaining that a loving cup might lead him into temptation, and from the executive committee of the Chicago Association of Commerce Mr. Hibbard received a gold mounted baton in recognition of his musical ability.

Telephones in New York City.—On May 24 there were 417,361 telephones in service in New York City, an increase of 15,837 since January 1.

Removal of Telephone Headquarters.—The division headquarters of the American Telephone and Telegraph Company now at St. Louis, Mo., are to be transferred to Kansas City, Mo.

Paris-Vienna Telephone.—The telephone line between Paris and Vienna was recently opened for public business. The tariff is $1.60 for an ordinary communication and $5 for urgent communications.

The Telephone in Constantinople.—A telephone contract has been signed in Constantinople and steps are now being taken in London to organize a company and the necessary engineering staff to carry the plans into effect.

Multiplex Telephony and Telegraphy.—Major George O. Squier will present a paper on "Multiplex Telephony and Telegraphy by Means of Electric Waves Guided by Wires" at the annual convention of the American Institute of Electrical Engineers to be held at Chicago, June 26-30.

Regulation of Telephone Rates in Denison.—The Denison, Tex., city commission is endeavoring to acquire the right to tax the franchise of the Southwestern Telephone and Telegraph Company and to compel it to place its wires underground in that city. It also desires permission to refuse telephone rates if they are not considered satisfactory.

Federal Telephone Company to Issue New Bonds.—The New York Public Service Commission, Second District, has authorized the Federal Telephone and Telegraph Company, of Buffalo, to issue $578,000 in bonds to pay for the purchase of the Niagara Home Telephone Company, the Dunkirk Home Telephone Company and the Independent Union Telephone Company.

Telephones for Damp Places.—Special telephones are now used by the German post office for use in damp places. They are similar to those used in tropical climates to stand the rainy season. All the iron parts are coppered and varnished, the wooden parts are coated with a waterproof varnish and the remaining parts are covered with impregnated silk.

Pennsylvania and New York Telephone Company to Sell Its Franchise.—A special meeting of the Bell Telephone Company of Pennsylvania will be held July 18 to vote on the purchase of the Pennsylvania and New York Telephone and Telegraph Company, and on the same day the stockholders of the latter company will hold a special meeting to vote on the sale of their property to the Bell interests.

Emergency Telephone Equipment for Bangor.—Some remarkably quick work was done in shipping an emergency telephone equipment to Bangor, Me., after the great fire there on April 30. The equipment, which consisted of seven sections of central battery lamp signal board with a capacity of 3,000 subscribers' lines, and filled two cars, was started on its way Monday morning, May 1, and reached Bangor early Wednesday morning. A large force began installing it at once in a hall that had been spared by the flames, and service was soon resumed.

Large Hotel Telephone Equipment.—The new McAlpin Hotel, on Broadway and Thirty-fourth street, New York, will be the best telephoned building in the world when it is finished. The contract covers 100 trunk lines, 1,800 stations and 500,000 local messages at an annual value of $25,334 for services. Sixteen telautograph instruments will also be installed at various points in the hotel. The telephone switchboard will have sixteen regular operating positions, and there will be three sub-switchboards, also a two-position switchboard for pay-station purposes in connection with nineteen booths to be located in the main corridor and at other points in the hotel.

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Practical Aspects of Printing Telegraphy.*

BY DONALD MURRAY.

No doubt in time wireless printing telegraphy will receive more or less attention, but it will not be of much importance, in this generation at any rate, because there cannot be any saving of line or line maintenance when there is no line. Any saving of labor that might be effected by wireless printing telegraphy is of trifling importance, because the wireless operator has to be in attendance in any case, and the speed of signaling is low.

For railway work printing telegraphs have hardly been employed at all up to the present, and as the telephone is gradually displacing the telegraph for most railway work in America, and therefore no doubt in time in other countries also, printing telegraphy does not appear to have any extensive possibilities in conjunction with railways. In time, printing telegraphy will probably play a considerable part in connection with ocean cables, but up to the present hardly anything has been done in this direction, because the conditions to be fulfilled are extremely complicated. There cannot at present be any line saving, because ocean cables are already utilized up to their full capacity. It will be possible to effect a slight saving of time and some saving of labor, but the apparatus will necessarily be of a very delicate and intricate character. The expenditure will necessarily be heavy, and the saving will not be more than about £300 ($1,500) or £400 ($2,000) a year on each cable at each end.

So far as the present position of printing telegraphs is concerned, the Hughes tape printer carries the bulk of the telegraphic traffic on the continent of Europe, and it has done so for nearly half a century, about 3,000 Hughes instruments being now in use. Most of the telegraph traffic between Great Britain and the continent is also carried by the Hughes, but this machine is only employed outside of Europe to a very slight extent. During the past thirty years the Baudot system, which may be described as a multiplied Hughes tape printer, has been developed and extended in France until all the telegraph lines of any importance are equipped with it. During recent years it has also made considerable progress in Italy, Brazil, India and Russia. In Russia it is quite extensively used, most of the leading towns in European Russia being connected by it. It has likewise secured some foothold in most other European countries, Paris being linked up by it to nearly all the capitals of Europe. Great Britain has proceeded in very leisurely fashion, and, so far, has only coquetted with printing telegraphy, more or less prolonged flirtations having been carried on by the British Post Office with the Hughes and Baudot, the Buckingham, the Murray automatic, the Siemens & Halske and several other systems. The latest arrival, the Murray multiplex, may be described as the child of the British Post Office, it having been developed with the assistance of that institution. The Murray automatic system has made most progress up to the present in Germany. It has also secured a foothold in Russia, Sweden and Norway. It is in regular commercial use between Hamburg and Berlin, Berlin and Frankfort, Hamburg and Frankfort, Berlin and St. Petersburg, St. Petersburg and Omsk in Siberia (about 2,400 miles, with three repeating stations), Stockholm and Gothenburg, Kristiania and Bergen. A new installation with all the latest improvements is being established between London and Dublin. For various reasons, however, the use of the Murray automatic system is limited to long lines and underground cables, and there is, consequently, not a very wide field for it, especially in comparatively small countries like Great Britain. The Murray multiplex, on the other hand, is very well adapted for moderate distances, but it has not yet had time to come into extensive use. In the United States the Buckingham system was developed under the auspices of the Western Union Telegraph Company, and some sixty circuits are now equipped with the Buckingham system as improved by Barclay.

Printing telegraph inventors are still busy increasing the height of the printing telegraph scrap pile, but the substantial results over the whole wide world are summarized in the foregoing paragraphs. These results are neither extensive nor brilliant, and it is an actual fact that less than £1,000,000 sterling ($5,000,000) would cover the value of all the printing telegraph machinery on the face of the earth to-day. This is the outcome of fifty years of constant labor by scores of inventors. We have only to compare this with the gigantic extension of telephone apparatus all over the world in only a few years to realize that there must be some hampering circumstances, some peculiar difficulties and obstacles in the way of printing telegraphy.

Before considering these difficulties the author discusses the four economies of fundamental importance in the transmission of intelligence—namely, to save time, to save labor, to save line, to save office equipment—and he emphasizes the heavy labor cost and loss of time in the transmission of telegraphic communications. The vital importance of printing telegraphs lies in the fact that they can greatly reduce the present waste of line and labor in telegraphy, and that they render it possible to foster the growing co-operation between the telegraph and the telephone. The telegraph and telephone are each strong where the other is weak. We can set out the points in tabular form as shown on the next page.

If we utilize the telephone as the short-line feeder and distributor for the long-line telegraph we get the ideal co-operation shown in the last

*Abstract of a Paper read before the Institution of Electrical Engineers, London.

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column of the table. The cost of office equipment will be increased, but this will be outweighed ten or twenty-fold by the economies of line, labor and time.

If telegraph messages were charged for like telephone messages—by time instead of by the number of words—a lot of the labor cost would

——	Telegraph.	Telephone.	Telegraph-telephone.
Time.....	Wasteful.....	Extremely economical	Fairly economical
Labor.....	Wasteful.....	Extremely economical	Fairly economical
Line.....	Very economical	Very wasteful...	Very economical
Office equipment.....	Cheap.....	Expensive.....	Expensive

fall away. A merchant would then ring up the nearest telegraph office. He would be switched on to the required circuit, and he would dictate his message direct to a telegraph operator, who would type it on a rapid keyboard tape perforator. The perforated message would run through an automatic transmitter, and would be printed automatically direct from the line signals at the distant station, from which point it would be telephoned at once to the addressee. This telephone-telegram idea is already slowly emerging into everyday use. The British and other administrations now accept and deliver telegrams by telephone, and the British Post Office has actually coined the special name of "phonograms" for such telephone-telegrams. To handle "phonograms" under ideal conditions there should be a system giving either high automatic speed of transmission or at least four simultaneous transmissions in each direction on busy lines, and the speed of each transmission should be a steady average of at least forty words a minute. Not only would quick handling and transmission of messages be necessary, but also quick reception and printing of the messages at the other end of the line ready for transmission by telephone. Printing telegraphs are a necessity for such methods of handling telegrams.

The chief stumbling-block at present is the practice of charging for telegrams according to the number of words, which involves an incredible amount of waste time and labor in counting the number of words.

In addition to the telephone as a local collector and distributor of telegrams, there appears to be a field for the small step-by-step printing telegraphs generally known as stock-tickers. The Siemens & Halske teletyper is a good example of this class of machine. These little machines, however, are more expensive and complicated and slower than telephones, and in the nature of things can only come into very limited competition with the telephone. The same remarks apply to the telewriter.

Meanwhile we have to see what steps we can take to reduce labor cost of telegrams under present conditions. The subject is very complicated and there are many obstacles, but threepenny telegrams and quick service would lead to a wonderful growth of telegraph traffic. These depend on rational co-operation between the telegraph and telephone, upon the extension of the telephone to practically every office and home, and last, but not least, upon efficient printing telegraphs. It is practically certain that in the course of the next ten or fifteen years the British Post Office alone will have to spend not less than a quarter of a million sterling on printing and other telegraph machinery in telegraph offices.

The printing telegraph inventor has to conform to most intricate and unexpected conditions, and although the telegraph administrations do all they can to assist in the development of printing telegraphy, they are still bound to look at the matter from the financial point of view, and to insist on a printing telegraph showing either (1) a saving of labor, or (2) a saving of line, or (3) a saving of time in transmission, or if possible all three. In fact, we may say that the difficulties in the way of introducing printing telegraphs are essentially commercial.

In Europe, excluding Russia, labor saving is most important, especially as the telephone has cut into telegraph traffic to such an extent that during the past few years the growth of telegraph traffic in most European countries has been small or nil. In giant new countries with magnificent distances, including the United States of America, Russia, Canada, South Africa, the Argentine, Brazil and Australia, the saving of wire is of the greatest importance, and some waste of labor may be tolerated if there is compensating line saving. In each case the relative advantages of line and labor saving have to be balanced to get the maximum benefit.

The difficulties in the way of labor saving in telegraphy may be roughly classed under two heads: those in connection with commercial messages and those in connection with press messages. Commercial messages are short and average about twenty words; continual stoppages of the mechanism are therefore necessary. With a page-printing telegraph the loss of time in cutting up tape and pasting it on message forms is saved, but provision has to be made and time allowed for line-feed, column-feed and page-feed. These delays take place every twenty words or oftener, thereby considerably reducing the saving possible in theory. The position is entirely different in the case of the stock-ticker and ticker news service, and practically the whole of the troubles are questions of mechanical maintenance.

Press Messages.—The conditions at the first glance are much more favorable for printing telegraphy, but actual experience shows that the obstacles are much worse than in the case of commercial messages.

The British system of news distribution is divided into the Post Office "News Division" worked

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by the Wheatstone system, and the leased and private wires rented from the Post Office by the leading British newspapers. London is the great originating and distributing centre for news, and it flows out from London all over the United Kingdom. Taking first the government service, in the British "News Division," news distribution is carried on by an elaborate arrangement of Wheatstone circuits, each message being perforated simultaneously on from one to eight tapes by pneumatic perforators, the tapes being then used to transmit press messages over as many as thirty different Wheatstone news wires, many of which have four or more towns strung on them *in series*. In this way news is distributed all over *the United* Kingdom at a very rapid rate, and with remarkable economy of labor, as one man can prepare a message for transmission to a hundred or more towns. There are very great difficulties in the way of any printing telegraph coming in and doing this work. In the first place, the news is distributed at a very high speed of from 200 to 300 words per minute. No printing telegraph can work steadily at such a speed on one wire. Also the Murray automatic system, and, indeed, any other printing telegraph using a special alphabet (not Morse), would require a piece of news to be punched in the Murray alphabet as well as in the Morse, unless the whole news service of Great Britain was handled entirely by the Murray automatic system. Apart from the speed difficulty and the cost of the apparatus, it would take years for a printing telegraph to be installed all over the country. Using it for a few circuits for news would mean double labor in perforating the messages, and although other advantages might be great enough to compensate for this extra labor, the speed of the line would have to be dropped to about 150 words per minute.

In other countries where there is no highly complicated arrangement for news distribution there is no obstacle to the use of such printing telegraphs as the Murray automatic; but in countries where there is no complicated news-distributing organization there is very little news traffic, and it can be handled easily by the Hughes and other low-speed and therefore cheap instruments.

Another difficulty about news work is that in London and other large centres of population at least twelve copies are required of press messages to various newspapers. It puts a serious strain on any typewriter to make twelve copies continuously for long periods of time at a high speed. Rotary mimeographs and hectographs get over the difficulty in New York, and there is no reason why they should not do equally well in London.

Newspaper Private Wires.—In the case of these wires the conditions that exist are even worse from a printing telegraph point of view. High-speed printing telegraphs are of necessity complicated, and require good mechanical skill to keep them in order. This means that a skilled mechanic with an assistant and a small workshop would have to be installed. The question of speed also is just as serious with newspapers as with the post-office. Take, for instance, a great provincial daily paper like the "Glasgow Herald." Every night it sends from 30,000 to 40,000 words from its London office to its Glasgow office 400 miles away. The great bulk of this news is sent over the "Glasgow Herald" private wire between 5 p. m. and midnight, and the conditions are such that it is absolutely imperative to have a speed of transmission over the line of not less than 250 words a minute (1,500 letters) and preferably 300. At present the work is done by the Wheatstone system, and there is a staff of six to eight operators in London, who punch the news in the form of perforated tape, and it runs through the Wheatstone transmitter at 200 to 300 words a minute, coming out in the Glasgow office of the "Herald" as dots and dashes on a tape, which is then copied out by a staff of eight to ten men. It is not apparent how any printing telegraph can meet such requirements. The writer tried it with the Murray automatic system, but the utmost that he could achieve was 184 words a minute, and even this was with very fine adjustment, much too fine for practical work; 150 words a minute was practical, but it was too slow. Less serious troubles are to be found in the fact that mistakes show up badly in the typewritten pages produced by printing telegraphs, and make the sub-editors uneasy about the accuracy of the messages. In the case of the Wheatstone the transcribers correct the errors as they proceed, and they write out clean "copy."

In spite of the great difficulties in the way of using printing telegraphs for news work, it would be taking too pessimistic a view to say that printing telegraphs cannot be used for press despatches. They can be and they are so used. In Germany and France, for instance, where the newspaper telegraph traffic is small, all the press messages are sent over the Hughes and Baudot printing telegraphs, and even in Great Britain printing telegraphs will in time make their way for news work; but it will be a very slow progress and very costly. The apparatus will have to be faultlessly made, and well-trained men employed to run it. There will probably be a saving of time, but the saving of labor will not be great.

The difficulties in the way of making a copy for record of telegrams delivered were explained, and the author pointed out that wet-press copying is the only practical method when printing telegraphs are used. The necessity for keeping copies of telegrams at all is not obvious.

When page-printing telegraphs are used a change is necessary in the telegraph forms used by various administrations. There are two kinds of telegraph messages, those sent from city A to be delivered in city B, and those sent from city A to be retransmitted in city B to city C. In city B nearly all telegraph administrations use two different kinds of telegraph forms to distinguish these two kinds of messages. For a page-printing telegraph only one form for both kinds of messages is possible.

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Numbering messages involves a waste of about two and a half per cent. in line time and labor; and the tendency is to omit all unnecessary signals. Whether consecutive numbers on telegrams are necessary appears to be an open question. Certainly numbering is a safeguard against messages being lost—an accident that happens occasionally in all telegraph offices. Hence when the Murray automatic system was introduced into the British telegraph service it was considered desirable by the officials to resume the numbering of messages on the Murray circuit. This is a small matter, but it involved a certain amount of change of routine, and in a big department a change of routine is a matter of difficulty. The experience of the writer is that the real conservatives are not the official heads but the operators, who often show extraordinary reluctance to accept change of routine. In fact, that is one of the minor obstacles to the introduction of printing telegraphs.

Counting the number of words in telegrams is a serious matter, causing much waste of time and labor. Charging by the number of words is a very defective system, but it is difficult to say what better arrangement could be adopted. As long as word counting remains in force it will be one of the hindrances to any considerable saving of labor by printing telegraphy. The number of words in the message is sent in the preamble, and it is the duty of the receiving operator to count the number of words in the received message to see that it agrees with the number in the preamble. In case of discrepancy this involves a talking back and forward, which, with printing telegraphs, is not so quick as with the Morse key. There are also so many Siamese twin words that are neither one nor two that counting is difficult, and the labor cost is increased. Thus, "motorbus" is one word, but "motordriver" is two. If it were possible to charge for telegrams in some way by time as in the case of the telephone, a lot of delay and labor would be saved.

Apart from these difficulties, the most serious trouble a printing telegraph system has to face is errors in telegrams. These, due to disturbances on the telegraph line, stray currents, inductive interference, men repairing the line, wind and weather, or to the human operator, involve repetition of messages and impose very serious limitations on the time and labor saving possible with printing telegraphs.

A special difficulty for printing telegraphs is also to be found in the variety and irregularity of telegraph traffic, which varies greatly in volume and in character according to the circuit and the seasons. There are also great variations in the volume and kind of traffic according to the hours of the day. Moreover, the present system of multiple address messages is impossible with a printing telegraph.

Traffic arrangements and hours of duty of operators are necessarily of a very complicated character in the case of large telegraph administrations, and the introduction of printing telegraphs leads to considerable variation of these arrangements. It is most difficult to introduce changes in the daily routine of large numbers of human beings. Of course, in the case of France, Germany and other countries on the continent of Europe, where the Hughes has been largely employed for more than a quarter of a century, such difficulties have long since adjusted themselves. It is in the Morse key and sounder countries that the introduction of printing telegraphs necessitates some changes of routine.

International telegraph traffic presents special difficulties because of the division of authority and difference in habits and ideas and customs, and differences in language. Alphabetical troubles are not the least that printing telegraph inventors have to encounter. Each country requires some variation in the telegraphic alphabet, and it appears to be a physical impossibility to devise a printing telegraph that will suit all languages. A curious illustration of this alphabetical difficulty is the confusion that exists in Great Britain through the use of the oblique stroke both for money and fractions. 3/8 may be read as 3s. 8d. or as ⅜. This confusion has led to monetary loss. Code and cipher messages also are the despair of telegraph administrations, but on the whole a good printing telegraph can handle such messages with less risk of error than the Morse key and sounder, and at least as expeditiously if proper methods are used. The essential condition is careful training of operators in working on typewriter keyboards without looking at the keys.

The use of envelopes and the addressing of telegrams present difficulties in the case of page-printing telegraphs. On the continent of Europe envelopes are not used, and the telegrams have to be folded up in special ways, varying with each administration. The printing of the messages must suit these methods of folding. This requirement is hard to fulfill in the case of a page-printing telegraph.

Finally, there are mechanical difficulties of construction. Printing telegraph machines belong to a theoretically bad group of mechanisms, in which the majority of the actions are striking instead of sliding or rolling, and it is only by close attention to details that success has been achieved.

New Form of Battery.

A new cell has recently been invented and patented by F. Di Palma, in Italy, which consists of electrodes of amalgamated zinc and lead peroxide respectively, immersed in sulphuric acid solution, and has a potential difference of two volts. The electrodes are placed horizontally in a closed vessel, the zinc one near the bottom, and the lead peroxide one in the center; the space between them is filled with sulphuric-acid solution and that above the lead peroxide is filled with compressed oxygen pumped in through a tap at the top of the vessel, thus reoxidizing the lead peroxide as fast as it is reduced. The apparatus may be used as a storage battery by charging with an electric current when the oxygen is exhausted, and is stated to be much lighter and to cost less.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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June 1, 1911.

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

Telegraph Service.

In any line of industry first-class results cannot be obtained with poor and inappropriate tools. A stone cutter's implements, for instance, could not be used for constructing a watch; neither could the watchmaker's tools be employed in building a locomotive, yet both kinds of tools must of necessity be of the best to produce the best results.

The output of a telegraph company is public service, and, although public service is an intangible thing, it is subject to the same laws that govern the production of tangible things, such as locomotives and watches. It requires tools of the proper kind in order to render efficient service to the public, and the quality of the service is measured by the quality of the tools employed.

A telegraph company's tools are its management, its plant and its operating force, and, in passing, it may be noted that it is on these general bases that the telephone company and the telegraph companies are organized and operating. No one of these three grand divisions could manifest any results without the co-operation of the other two. The management furnishes the ideas which, when put into practice, will produce results; the plant (wires, batteries, instruments, etc.) furnish the means of producing results and the operating forces control these means. Ideas themselves, as ideas, are of no use to mankind, neither is inanimate plant; the plant can do nothing of itself; it requires human electromotive force to put both into action. This is the sphere of the operating force; and, as already stated, the quality of service rendered depends upon the quality of the means used to render it. Poor management cannot in any possible manner keep the plant in proper condition and maintain discipline and efficiency in the operating department; poor wires, batteries and instruments cannot give satisfactory results because they are poor tools, and a poor operating force cannot perform first-class work—all three must be efficient and harmonious in action. If one is deficient the others are correspondingly affected.

The most important desideratum in the conduct of a telegraph business is a high standard of efficiency and its maintenance. The patrons of the company know a good deal more about this quality than most people think they do. They judge of the efficiency of the company by the service it renders. If messages are garbled, badly written or full of errors the recipients very naturally are led to think that the company is weak in the performance of its duties, and they lose confidence in it. On the other hand, if messages are delivered neatly written, on the typewriter preferably, and without errors, confidence in the service is promoted and the public is satisfied.

We recognize the fact that some of the errors in the transmission of business are properly chargeable to the writers of telegrams themselves, but with that we need not concern ourselves here. The company's duty is to do its share of the work properly and as well as it can be done in the face of such obstacles.

One of the principal aims of the telegraph and telephone companies is to interest the public in their services and foster a more liberal use of them. They well know the value of efficient service in the attainment of this result, and it is to their credit that they are doing everything possible to gain the confidence of the people. They are increasing their facilities, not only in establishing new lines, but in improving present plant and adopting new devices designed to aid in the accomplishment of that one great purpose. In addition to this they have not overlooked the fact that while the plant must be improved the means of operating it must also be improved. The operating force is being raised to higher standards of efficiency and the future outlook for the operators, clerks, etc., is more encouraging now than ever before. A spirit of enthusiasm and zeal pervades the ranks to a degree never before attained and the companies are putting forth every endeavor and offering every encouragement to their men to better fit themselves for their present positions and for future advancement. The rapid expansion of the telegraph service and its exacting de-

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mands require a high grade of intelligence on the part of the employes, and it is gratifying to note the great changes that are taking place in this direction through the encouragement of the companies. There are no doubt some individuals who may not look at the situation enthusiastically, but fortunately they are in the minority. They stand in their own light and are a bar to progress of any kind. Action is the motive-power of all progress; lethargy clogs the wheels.

An Early Reference to the Telegraph.

BY D. MCNICOL, NEW YORK.

Modern newspapers occasionally manifest their activity and enterprise as newsgatherers by securing scoops covering the details of some event of great moment. Any periodical publication being the first to announce to the world the details of a great calamity, the exposure of a disastrous fraud, the announcement of a horrible crime or of any event of unusual importance, is credited with having made a scoop.

Almost any newspaper publisher or magazine editor would be glad to have scoops as laurels, and the fame of many a publication has been established by the success of its managers in publishing news items of local or national importance before other contemporary publications noted the happening.

As an evidence that even magazines may have "greatness thrust upon them," there is the case of *The Scot's Magazine*, which in its issue of February, 1753, published a contribution from a man who signed himself "C. M.," to which article the editor gave the title, "An expeditious method of conveying intelligence."

This communication contained the earliest known reference to an electric telegraph, and as the telegraph was the forerunner of all electrical activities, historians of electrical development in every civilized country in the world have in hundreds of instances made reference to the article which appeared in the issue of *The Scot's Magazine* referred to. Thus this magazine, which apparently had little other claim to greatness, secured a scoop in February, 1753, with which for all time to come it will be credited.

The article in part states: "It is well known to all who are conversant in electrical experiments that the electric power may be propagated along a small wire, from one place to another, without being sensibly abated by the length of its progress; let, then, a set of wires equal in number to the letters of the alphabet be extended horizontally between two given places parallel to each other and each of them about an inch distant from that next to it. At every twenty yards' end let them be fixed in glass or jeweler's cement to some firm body, both to prevent them from touching the earth or any other non-electric and from breaking from their own gravity."

The writer then goes on to explain his proposed method of operating the telegraph whereby bits of paper bearing the letters of the alphabet are placed an eighth of an inch below suspended metallic balls at the receiving end and are attracted thereto as each wire is electrically charged from the distant station. Thus by observing the letters affected the receiving operator may form the words of the message transmitted.

After the publication of the "C. M." article nearly a quarter of a century elapsed before the first method of electric telegraphy was tried out, namely, that of Georges Louis-Le Sage, of Geneva, who in the year 1774 constructed a telegraph machine practically along the lines suggested in the article referred to.

Supreme Court Decision Against Standard Oil Company.—The United States Supreme Court, on May 15, approved the decree of the Circuit Court for the Eighth Circuit directing the dissolution of the Standard Oil Company. The court determines against the Standard Oil Company on the ground that it is a combination in unreasonable restraint of interstate commerce. The period for the execution of the decree is extended to six months.

General War on Loan Sharks in New York.—Prominent merchants and representatives of large corporate concerns in New York, employing thousands of people, held a conference on May 18 on the question of loan sharks and declared a systematic warfare against them. Among the interests represented were the Postal Telegraph-Cable Company, the New York Telephone Company, the New York Edison Company, the General Electric Company, the Erie Railroad and the Brooklyn Rapid Transit Company. The employers pledged themselves to work for the enactment of more rational loan legislation, and to install, wherever practicable, co-operative savings and loan associations, whose funds will be at the call of all employes on a company's payroll in case of trouble, sickness, or other legitimate need for money. By this means the merchants expect to cut down the zone of the loan shark's operations.

Mr. Vail's Views on Regulation.—The views expressed by Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, in his recent annual report to the stockholders on the subject of "Public Service Regulation," have received much commendation from the press. They are regarded as being based on broad gauge principles and the governors of Colorado, Oregon, Wyoming, Michigan, North Dakota, Illinois, and other states, have gone on record as approving Mr. Vail's attitude on this question.

Combined Telephone and Telegraph Building for Buffalo.—The proposed new building in Buffalo, N. Y., for the New York Telephone Company will provide quarters for the Western Union Telegraph Company. It will be erected at Church and Franklin Sts., and will be a modern fire-proof structure.

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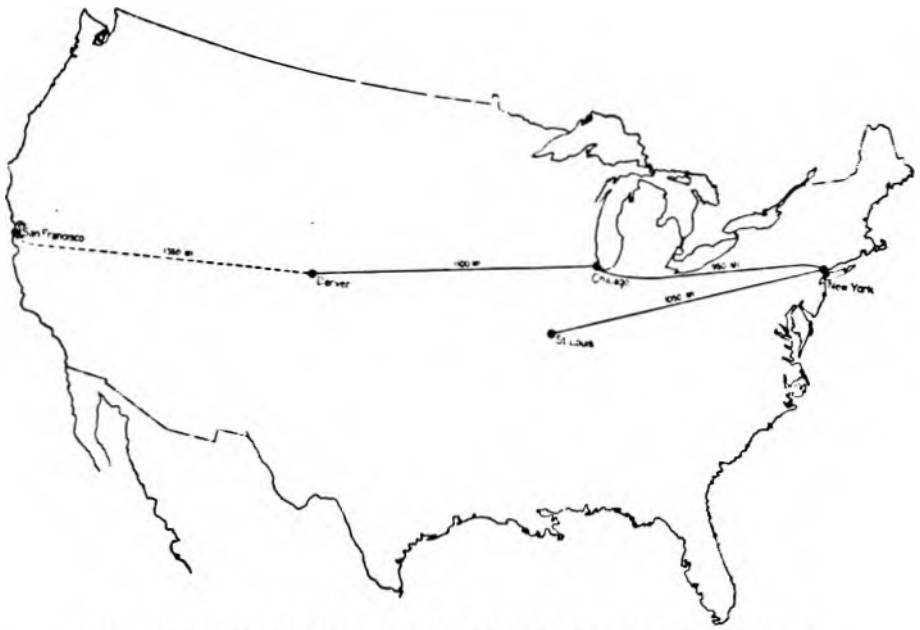
Some Recent Advances in Transmission Efficiency of Long Distance Telephone Circuits.*

BY B. GHERARDI, ENGINEER OF PLANT, AMERICAN TELEPHONE AND TELEGRAPH COMPANY, NEW YORK.

In June, 1900, Professor M. I. Pupin, who is one of our guests of honor this evening, took out his patents for loading. Since that time practical applications of loading on a very extensive scale have been made in the plants of the American Telephone and Telegraph Co. and the associate companies, and most gratifying results in improved transmission and economy in first cost of construction have resulted from the applications of Professor Pupin's invention. At first the work done dealt with the loading of ordinary open wire lines and standard cables and with the perfection of the apparatus required to accomplish these results. Later attention was directed to the more complex problem of loading phantom circuits, the loading of our high-grade No. 8 circuits and the design of special cables so constructed that phantom circuit working was possible in connection with loaded cable conductors. As a result of the work which has been done along these lines during the last two years some very remarkable improvements in the transmission efficiency of long lines and cables have been made. The New York-Denver circuit, which is now in operation, and the Boston-Washington cable, which is in process of manufacture, have been made economic possibilities by these advances. While it cannot be said that these results could not have been obtained with our knowledge of the art as it was two years ago, it may safely be stated without fear of contradiction that the cost of such work, as it would have had to be done with our knowledge of two years ago, would have been so great as to have been commercially prohibitive.

Mr. Gherardi then described the New York-Denver circuit and dealt with the engineering problems involved.* "One of the aims of our president, Mr. Theo. N. Vail," he said, "is to give universal service. The first step in the direction of giving such service is obviously to be able to give transcontinental service—that is, a talk from New York to San Francisco. The illustration shows how much of a step in this direction has been made since Mr. Vail's wish on this matter was stated about two years ago. This diagram shows what we could do two years ago, what we can do now, and how much remains to be done to get to San Francisco. It was a long step from Chicago to Denver. One more step a little longer will take us to San Francisco.



MAP OF NEW YORK-DENVER-SAN FRANCISCO TELEPHONE LINE.

The problem of loading No. 8 circuits, Mr. Gherardi continued, was primarily a problem in connection with the insulation of the line wires. A No. 8 circuit can be loaded with the same coils used on No. 12 circuits and these coils would be spaced in the same manner, that is, at 8-mile intervals. It has been a fact known to us ever since we started to do commercial loading that low insulation on a loaded circuit has a much greater effect in impairing the efficiency of such a circuit than the same insulation has on an unloaded circuit. It has also been known that the effect of low insulation on the No. 8 circuits was much more serious than on the No. 12 circuits.

When we first began to load our open wire circuits about ten years ago it was found that the No.

* Abstracts from a paper read before the New York Telephone Society, April 18.

* A full authorized description of the New York-Denver telephone line was published in Telegraph and Telephone Age, May 1.

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12 gauge circuits which had been loaded gave satisfactory results in dry weather. In wet weather the results were not so good, due to the lower insulation at such times, but these results were good enough. In the case of No. 8 circuits, however, it was found that when they were loaded the effect of low insulation was so serious in wet weather that at such times the circuit was no better than if it was unloaded—sometimes even worse. A system of loaded No. 8 circuits could not, therefore, be considered satisfactory, as it would be a system which part of the time would be better than if not loaded and part of the time worse.

It having been established that a substantial improvement would have to be made in the insulation of No. 8 circuits in order that they might be successfully loaded, and reasonably uniform results obtained from the loading, a study of line insulation conditions was made to determine what steps would be necessary in order to improve the line insulation. Aside from the general insulator leakage two particularly weak points were found in the insulation of open wire circuits. One of these was at transposition points. Actual measurements showed that the leakage on lines equipped with standard single pin type transposition insulators was 20% greater during wet weather than on lines where the two wires were never allowed to be on the same pin. Of course the old standard transposition which employed two insulators, both of the transposition type, and in which the wires were tied to both of them, was just twice as bad as the single pin transposition already discussed. The method of overcoming this difficulty was to transpose the wires without bringing them onto the same insulator. The same problem, of course, arises when phantoms are involved and having used the phantom bracket for the transposition of physical circuits, something else is required when phantoms are involved. By the means described the transposition as a factor in producing low insulation is eliminated and the transposition points are made just as good as any other point in the line.

Another point at which it was found that there was considerable leakage was where, for the purpose of inserting loading coils, connecting with a test station, or for any other reason, the wires were bridled. These places were particularly bad during wet weather, especially after the bridle wire had been in service for a short time and had weathered. The braid on the bridle wire soon becomes weathered and when wet is a fair conductor. Leakage takes place easily over the wet surface at the end of the rubber insulation and thence to the wet braid. This difficulty was overcome by a very neat device known as a bridle wire insulator. The adoption of this arrangement has completely eliminated low insulation at bridling points.

In addition to the changes at transposition points and at bridling points it was thought desirable on the first of these loaded No. 8 circuits to use a line insulator that would be more efficient than our standard glass insulator. After a careful study of insulator design and insulator materials, it was decided to try on these circuits a double petticoated porcelain insulator. Tests on these insulators extending over a period of several years have shown that the new insulator is several times as good in wet weather as the standard insulator. Part of this improvement is due to the design of the insulator. Some is attributed to the use of porcelain. An objection to these insulators is that they are not so easy to manufacture uniformly, and that each insulator must be inspected, whereas with glass insulators they may be inspected by sample. These porcelain insulators also cost considerably more than glass insulators.

As a result of applying the improvements described to our No. 8 circuits, it has been found by measurements and tests extending over a long period that the line insulation was at all times sufficiently good to warrant the loading of No. 8 circuits.

The problem of the phantoming of No. 8 circuits is one in phantom repeating coil design. To meet the special conditions existing in connection with the phantoming of loaded No. 8 circuits as used in our plant, it was desirable that apparatus should be developed of the highest possible transmission efficiency. In order to do this the ringing efficiency of the phantom coil was sacrificed and special means for ringing through these coils had to be adopted. In this way and by specially designing a coil to meet the circumstances of these circuits, coils that were suitable were developed.

Up to very recently, while we knew how to phantom ordinary circuits, it was impracticable to phantom loaded circuits because the loading coils so unbalanced the phantom and so increased its effective resistance that a phantom circuit created out of loaded circuits could neither be made quiet nor made efficient from a transmission standpoint. This problem is one of loading-coil design. In order to overcome this difficulty, it was necessary to devise special arrangements of the windings on the loading coil so that while the coil would still be effective in respect to the current flowing in the physical circuit, the effect of the current flowing in the phantom circuit would be such as not to magnetize the loading coil core. These windings had not only to be balanced magnetically, but also to be so arranged that the electrostatic capacities between the various windings of the coil would not unbalance it. Such coils were devised and are now in successful use on the New York-Denver circuit.

The phantom produced in this manner is, however, not loaded. It is, of course, desirable to load the phantom in order to obtain the benefits of improved transmission on this circuit also. To do this another coil was devised, the windings of which were so arranged that they would introduce inductance in the phantom circuit without affecting the side circuits.

Mr. Gherardi then dealt with the Boston-Washington underground telephone cable and gave many interesting facts in connection with the work. This part of his address will form the subject of an article in a later issue.

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The Commercial Side of the Telephone and Telegraph Business.

Mr. S. M. Williams, manager of the Commercial News Department of the Western Union Telegraph Company, New York, was the principal speaker at the meeting of the Telephone Society of New England, which was held in Boston April 13. It was a "Western Union Evening" and marked the joint relations now existing between the American Telephone and Telegraph Company and the Western Union Telegraph Company.

Mr. Williams spoke on "The Commercial Side of the Telephone and Telegraph Business."

"Some months ago," he said, "the Western Union Telegraph Company made an analysis of the use of the telegraph in various cities on a basis of per capita expenditure. The results disclosed that New England cities, with the exception of Boston, were at the very bottom of the list, and itself made only a mediocre showing. The poorest town in the United States in telegraph business, on a per capita basis, is Somerville, Mass., and in close company with it are Fall River, Lowell, Lawrence, Pawtucket and New Bedford.

"On the other hand the best telegraph city, on the same basis of figuring, is Kansas City, followed by San Francisco, Dallas, Texas, Salt Lake City, Oklahoma City, and Houston, Tex.

"It would be interesting to know how these same cities stand in a telephonic list. I venture to say that some of the positions would be almost reversed, although I am aware that in installation development western cities stand very high. I think I have been told that Dallas is very near the top.

"Between New England and old England there is rather striking contrast in the use of the telegraph. According to compiled statistics old England makes the largest per capita use of the telegraph of any of the nations, although its financial balance sheet is not to be taken as a good example. The latest report of number of messages sent shows England leading with 1.84 per capita and France coming next with 1.52. But these figures cannot be taken accurately for purposes of comparison, because different systems of counting prevail.

"We have not in the United States any reliable figures on the use of the telegraph. The Western Union makes full reports upon the volume of its business, but other companies do not. Still, I think it would be a reasonable estimate to make that last year there were 100,000,000 telegrams sent in this country. But this figure does not represent all the telegrams, because there is no record of the large number of messages sent over leased wires, and the leased wire system of the United States is much greater in extent than in England or in France. There is a large amount of railway telegraph business, also, that does not enter into the count.

"But taking such figures as are available, there is the nominal showing that England sent 1.84 messages per capita, while the United States sent about 1.10. This discrepancy is accounted for in two ways: first, by the fact that the telegram is a customary method of social communication in England, while in this country it has been used socially only in cases of emergency; and, secondly, the slow development of the telephone in England compelled the continued use of the telegraph even for short distances.

"Merely because I mentioned the English telegraph system, and not as having particular reference to government ownership, there is one rather interesting fact to be added concerning it. The net loss on the British telegraphs is half a million dollars per month, or approximately six million dollars per year. My authority for this is the London Times, which recently analyzed the post-office accounts. That sum would pay an additional six per cent. dividend on Western Union stock.

"The other European nations render no telegraph financial reports that give us any adequate opportunity of making up a balance sheet. They lump their telegraph expenses in with post-office accounts, and then beg parliaments for annual appropriations, which come out of public taxation. The masses contribute so that the relative few who use the telegraph may have the advantage of cheap rates. The burden, as you in Boston know from your recent rate inquiry, does not fall on those who derive the benefit and should be made to pay for the service.

"We are endeavoring in the Western Union to carry out Mr. Vail's magnificent principles of making a full utilization of facilities. The telegraph had a plant of vast extent that lay almost dormant during most of the night. The Night Letter was put on the wires, and the result was gratifying. It pleased the public and it awakened a sleeping plant non-productive during those hours. The Night Letter was announced one year ago on March 7, and within the twelvemonth it became an established institution, an integral part of American life, both for business and social use.

"Now we have the Day Letter. Some of you may be a bit hazy about the details of its transmission, and ask when do we send it and how much delay there is. The answer is simple. The Day Letter is a filler to keep the traffic load line on a high even level. If you look at the chart in Mr. Vail's recent report you will see that the peak of the telegraph load is near to 11 a. m. and it holds a high level until about 3 p. m., when it drops sharply. We must have the facilities and the force to meet the maximum demand, and these must be employed all day even though there is sharp fluctuation of the load. Every minute there is a drop in the traffic and a peak is about to become a valley, the Day Letter is put on the wires and sent along. Large

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numbers of them are ready for the first opening. Some may have to wait an hour, some that may come in at the moment of opportunity are placed immediately on the wire. But we find that the average delay is much smaller than anticipated.

"The new development of the telegraph lies along three main lines. The first is the increase of the number of persons who use the wire. The second is the introduction of new forms of service and improved methods of transmission. The third is the welding together of the telegraph and telephone facilities so as to produce the most advantageous results both to the public and to the companies.

"The great mass of American people have not been taught or induced in the past to get the telegraph habit. Certain classes have it to a point of saturation, but for ninety per cent. of the population, the telegraph has been only an emergency service to be used only in times of direst need. Now we are preaching the gospel that the telegraph is a money-making service for every business man and a means of pleasurable communication in social life.

"For lack of statistics, I can only guess at how many people in the United States send a telegram in the course of a year, but I feel confident that not to exceed 10 per cent. of them did in 1910. Thus, broadly speaking, we have 10,000,000 telegrams, or an average of 10 per person, while some 80,000,000 people did not use the wire at all. But among the 10,000,000 users, there were many who sent only a single message, on the occasion of some family crisis or business emergency. The great bulk of the entire telegraph business of the country is done by fewer than 5,000,000 people.

"This refers only to the land lines. On the cables the conditions are even more extreme. A very small group of financial and business houses with a few newspapers added do 95 per cent. of the cabling. The general public enjoys the facilities of the cables practically not at all. The future of the telegraph does not lie in the furnishing of extraordinary facilities for the benefit of the few large patrons. Its development must come through the patronage of the great public and to induce that the service must be popularized and adapted to meet the needs and the convenience of the millions now outside the fold.

"Dealing with the second line of development, namely, new forms of service and improved methods of transmission, I have referred to the Night Letter and the Day Letter, which we believe to be only the forerunner of other uses to which our million and a quarter miles of wire and our 25,000 offices may be adapted. For a century past the mails have been the almost exclusive channel of communication. Mr. Vail performed wonderful service for the postoffice perfecting this method of transmission during the years he was connected with the railway mails. Then he took hold of the telephone and began to cut great inroads on the local use of the post, and now he is blazing the way for the telegraph to take on an increased burden of the long haul. This is not competition with the mails. It is simply providing the facilities for swifter means of communication to meet the demands of our rapid American life in all its phases.

"But there is a very clear vision of the practical and material benefits to come from the co-operation of telegraph and telephone services. We hear much these days about educating the public up to appreciation of certain things and conditions, but that indefinite entity called the public has some very definite ideas of its own and often gets ahead of its self-constituted instructors. Mr. U. N. Bethell, president of the New York Telephone Company, tells this story illustrative of the point. A telegram was received at the Western Union office in Havre de Grace, Md., dated from some point in West Virginia, and addressed to the manager of the Telephone Company. It read something like this: 'Telephone 467 party J Chesapeake City to tie up baby's cow's calf. Will be home to-morrow.'

"The telephone manager was puzzled by this new public demand for co-operative service, so he called up his superior in Baltimore, who likewise was puzzled but finally rendered this Solomon verdict: 'Do what the telegram says.'

"So the message was delivered and accepted as entirely satisfactory. Then the manager inquired of 467 party J what it meant, and was told by a husky farm hand that it was perfectly simple. The owner of a farm down on the eastern shore of Maryland was arriving home the following day and unless the farm hand tied up the calf, the family baby would not have a supply of fresh milk. The farmer had called upon the telegraph and the telephone as public servitors to perform a certain service for baby, and he knew better than the managers how to go about it."

Carrying Messages for Exercise.—Mr. John D. Donahue, a wealthy citizen of Brooklyn, N. Y., has joined the messenger force of the American District Telegraph Company in that city for exercise. Mr. Donahue is 53 years of age and looks upon his new work as interesting and regards the duties as light. He loves to be out of doors. It is stated that Mr. Donahue has a fortune of $500,000. He does not expect to increase his fortune materially, however, by carrying messages. All he wants is exercise, and he will probably get it in his new line of duty.

Electricity at the Society Islands.—Mr. C. A. F. Ducerron has entire control of electrical enterprises in Papeete on the island of Tahiti, Society Islands. He has in operation on the island seventy-four telephones and a wireless telegraph station which has a transmitting and receiving radius of 180 miles. He also operates the electric light plant. The natives stand and gaze at the electric light by the hour and many of them make long voyages from neighboring islands to see them.

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Tent Telegraph Office at Military Camp.

The accompanying illustration is a view of the Western Union Telegraph Company's tent office at the manoeuvre camp at San Antonio, Tex. When the troops were concentrated there the single wire between government headquarters and the main office was duplexed, and an additional operator was placed at headquarters, the government supplying one. A loop was then run from the main office to the manoeuvre camp, which is one and a half to two miles beyond government headquarters. This loop was also cut into government headquarters. It is about two

TELEGRAPH OFFICE AT ARMY MANOEUVRE CAMP, SAN ANTONIO, TEX.

and a half miles from the main office to government headquarters and about four miles to the camp.

The wires are run open, overhead from headquarters to the camp, and from the main office to government headquarters in cable. Only one operator is employed at the camp office, which is treated as a branch of the San Antonio office. This unique office, it will be noticed, is provided with modern equipment, including a typewriter and a messenger with bicycle.

Mr. J. L. Newton is the manager of the San Antonio office, and Mr. J. F. Marshall chief operator.

Mr. P. L. Lee, manager of the Postal Telegraph-Cable Company, Milwaukee, Wis., in renewing his subscription for another year writes: "It is needless to say that I am extremely well pleased with the paper. In future always renew my subscription."

Electricity in War.

The uses of the telegraph and telephone in the United States army are interestingly described in the *Electrical Record*. The army is up to date in its signaling equipment, which must necessarily include the telegraph and the telephone, and the article deals with these two branches of the service in detail.

In the field service of the United States army the ordinary telegraph apparatus is modified to suit the conditions. A new signal corps instrument of value is called the "field induction telegraph kit." The outfit weighs about eighteen pounds and tests show that the apparatus works successfully for from 250 to 300 miles over No. 9 galvanized iron wire.

There is an ordinary service telephone set as well as a lighter instrument known as the field telephone. Complete with battery, this instrument weighs only twenty pounds and may be carried anywhere in the field. In the work of the outposts of an army this equipment is generally of far greater value than visual signaling, its secrecy being a cardinal advantage.

The Russell cut-in telephone set, weighing only ten pounds thirteen ounces, with battery, is another valuable instrument designed for operation over short distances on telegraph lines. The so-called field artillery telephone is an instrument designed for use by the field artillery in communicating over base lines. It consists of a transmitter with a battery key, induction coil and battery and a head telephone with flexible bands. No facilities for calling are provided.

An important equipment is the field switchboard,

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which is especially adapted to camp service. It consists of a strong oak box with leather carrying case, ground-rod and tripod, the inside of the box being equipped with ten line drops with the necessary ringing, listening and connecting cams to enable four sets of connections to be established simultaneously. A breast set and single head receiver are provided for the operator. The entire outfit weighs about seventy-five pounds and can be set up in a few moments.

The field buzzer is one of the most important devices used in a modern army, as it is practically the only instrument capable of operating successfully over hastily constructed lines in the field, whose insulation cannot be of the best on account of the contact with the ground, water, dampness and metallic obstructions which often are encountered.

The buzzer is a combined telephone and telegraph instrument working on the principle of self-induction. A very rapid interruption is provided, giving a high pitched note in the telephone receiver, which is used as a sounder when the apparatus is employed as a telegraph instrument. The American army in China and the Philippines used it extensively and habitually as a means of telegraphing over hastily constructed lines of too poor insulation for ordinary Morse instrumental service.

The buzzers used in the United States army are either of the field type or the cavalry type. With the field buzzer, which weighs complete about eleven pounds five ounces, a waterproof telephone transmitter with a push button key is provided in addition to the buzzer proper. When the telephone set ceases to be effective the buzzer is usually still capable of performing the most exacting service. The cavalry buzzer is of the same general type but its weight has been cut down to five pounds twelve ounces.

Wireless telegraphy and telephony are important factors in military campaigns, but neither has passed far enough beyond the experimental stage to warrant the placing of the greatest confidence in these methods of communication. In the important field of coast defence, however, wireless telegraphy is as available as on the ocean itself. For land service it must at present be regarded largely as a resource rather than as a main dependence.

One of the most important applications of wireless telegraphy thus far made in the United States army is that at Norton Sound, Alaska, as a part of the Valdez-Nome system of the service. Five thousand words have been transmitted over this section in a single afternoon. The Seward Peninsula of Alaska is cut off from the world for about eight months of each year, except for an occasional mail carried by dog sled, and over 1,000,000 words were sent over this route in the first year of its service.

In the Philippines wireless telegraphy is growing constantly more valuable, particularly in replacing cables difficult to maintain among coral reefs. Wireless stations exist for artillery work at many coast fortifications on the shores of New England and the middle Atlantic States. One of the most effective equipments used in the United States army is designed to be carried by pack mules and is divided into three 150-pound loads. The transmitting and receiving apparatus is contained in a leatheroid trunk, 30x17x14 inches inside measurement. Current is supplied by storage batteries or by land generator.

Extensive applications of electricity are made in the important service of coast defence, notably in the operation of searchlights, manipulation of coast defence guns and mortars, operation of ammunition hoists, range and position finders, field and fortress telephone and telegraph service, the lighting of casemates, garrisons, gun sights and magazines, the firing of guns, submarine and subterranean mines, the control of dirigible torpedoes and the timing of projectiles by chronographic methods in ballistic experiments.

Fire control requirements demand that the battle commander's station shall be so equipped as to communicate electrically with district, fire and mining commanders and with the searchlights attached to the station; that the fire commander's station shall be so equipped as to communicate with the battle commander and with each primary and secondary battery of his command; that the mining commander's station shall be equipped to communicate with the battle commander, the secondary station mining casements, loading room and with the rapid fire batteries and lights assigned to the mining command, etc.

To establish such communication the signal corps provides telephones of special type, the telautograph and telegraph, electrical appliances for indicating time intervals, for the collection of meteorological and tide data and range zones. The telautograph is coming into widespread service in fortification duty as a supplement to the telephone and buzzer, both of which might easily be useless in the terrific din of a bombardment.

The whole tendency of electrical applications in war, says the article in conclusion, is to reduce fighting to a push button basis. Courage of the highest type is required to face the hidden terrors made possible by electricity, and if the conduct of campaigns loses in dramatic interest in comparison with the spectacular hand to hand combats of former ages, war gains in destructive power through the utilization of scientific progress. And destruction is the chief business of modern military conflicts.

Self-Adjusting Relay.

A self-adjusting relay is being patented by Mr. C. H. Lacey, of Fulton, Ind., for which the inventor claims many advantages. While the cost of manufacture will probably not much exceed that of the ordinary relay, the advantages gained will more than offset the additional expense. Mr. Lacey states that the relay is sensitive and will close the local circuit on a current of five milli-amperes. One of the claims made for the relay is that it prevents the armature of the sounder used in connection with it from sticking when an abnormally heavy current

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passes over the line wires and it adjusts itself to wide variations of current on the main line.

Unlike the armature of the ordinary relay, the armature of this instrument is not limited to a very slight movement but is free to move against the tension of the retractile spring until the pull of the magnetism is balanced by the tension of the spring. Any variation in the strength of the current will cause the armature to move until the magnetic pull and the tension of the spring are again balanced. To effect an opening and closing of the local circuit the switch lever contact and its back stop are carried forward with the armature contact until it has almost reached the balancing point. The lock armature, carrying with it the front contact and its back stop, is then locked in position by its magnetic contact with the pole pieces of a second electromagnet, the windings of which, together with those of the main electromagnet, are connected in series with the main line. The make and break devices are included in a shunt across the leads of the main lines and excluding the windings of the second electromagnet, but including the core thereof and the lock armature.

When a light current is traversing the coils, the armature will move only a short distance, and may not unlock or move the lock armature on the poles of the second electromagnet, remaining magnetically locked across the poles of that magnet, but should a heavy current traverse the coils tending to move the armature a greater distance, the greater pressure between the contact points and the contact arm will move the switch lever so as to shunt the coils of the second electromagnet. This action results in carrying the lock armature to a point where the magnetic pull is balanced against the resisting spring.

Cat and Parrot Tales.

It was the late Charles A. Dana, editor of the New York *Sun* who drew the attention of the world to the wisdom of cats. The *Sun's* editorial cat had the rare gift of being able to discern good from bad manuscript and lived on those of the latter quality, including poetry. Whenever an aspiring author did not see his contribution in print, nor get it back, its disappearance was charged to the office cat.

Cats are wise animals and although they cannot communicate their thoughts to the brains of human beings they can manifest them by their actions. We will not try to give any explanation why two of the most wonderful cats and an equally wonderful parrot belong to telegraph men, simply because we cannot. We record the facts as they were told to us by three veracious gentlemen at the recent dinner of the Magnetic Club in New York.

Mr. J. J. Ghegan, president of J. H. Bunnell & Company, New York, who lives in Roseville, N. J., has a cat that has been so well trained that it can tell a policeman from an ordinary citizen. When a guardian of the peace passes the house the cat runs out and shakes hands (or paws) with him. Now, some evil-minded persons might draw the conclusion from this that the cat sees some connection between policemen and his owner, but this explanation cannot be considered because there is a no more law-abiding citizen than Mr. Ghegan, and it is doubtful if he knows a suburban policeman when he sees one.

Mr. J. B. Taltavall, publisher of this paper, also has a cat in his family. It is a beautiful and intelligent animal and is an excellent operator. There is a wireless outfit in Mr. Taltavall's home, in East Orange, N. J., and the ether, surcharged as it is with electromagnetic waves, has had a remarkable effect upon pussy. In fact the cat is tuned to the wireless and it will lie on its back with its ear alongside of the receiver and kick the Morse characters with its hind paws as they are received on the telephone.

The third story was told on Mr. E. J. Nally the genial vice-president and general manager of the Postal Telegraph-Cable Company. Mr. Nally has a parrot. Its owner being a telegraph man, the parrot naturally lives in a telegraphic atmosphere. It was trained to telegraph and it did so until the Interstate Commerce Commission issued its order prohibiting the further issue of telegraph franks. Since the day the order went into effect the parrot has never touched a key.

New Book.

"Wireless Telegraph Construction for Amateurs." By A. P. Morgan. The intense general interest in wireless telegraphy is evidenced by the number of books being published on the subject, and as a rule they are excellent expositions of the art. This new book is all that could be desired for the beginner especially, and, indeed, for the technical and practical wireless telegrapher as well.

The subject is very thoroughly covered, and the language is so clear that the reading and study of the work is a course of instruction in itself. An idea of the scope of the book may be obtained from the chapter headings as follows: Introductory, Apparatus, Aerials and Earth Connections, Induction Coils, Interrupters, Transformers, Oscillation Condensers and Leyden Jars, Spark Gaps or Oscillators, Transmitting Helixes, Keys, Aerial Switches and Anchor Gaps, Hot Wire Ammeter, Oscillation Detectors, Tuning Coils and Transformers, Receiving Condensers, Telephone Receivers and Headbands, Operation.

The book is well illustrated with views of aerials and circuits of all kinds and of the instruments used in wireless telegraphy. The author's purpose is to give practical information for those who may wish to build for private or experimental use a set of wireless instruments which are more than toys but yet not so expensive as the commercial apparatus, and he has used the English language to good advantage in the attainment of his purpose. The book is well gotten up and shows pains and experience in its execution. The price is $1.50 per copy, and copies can be had from Telegraph and Telephone Age, 253 Broadway, New York.

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Personal Recollections of the Late Charles Minot.

BY C. E. M'CLUER, NORFOLK, VA.

The biographical sketch and portrait of Charles Minot published in your issue of April 16 interested me greatly. I was carried back in memory to the year 1851 or 1852 when I, as a boyish clerk in the pioneer electrical establishment of J. W. Norton, at 177 Broadway, New York, became quite intimately acquainted with Mr. Minot. He was then the general superintendent of the New York and Erie Railway, and was intensely interested in the construction and equipment of the pioneer railway telegraph line then in course of construction along the iron link between the New World metropolis and the Great Lakes. Much of the material for this line was purchased from Mr. Norton, and if my memory is not at fault all of the equipments were the product of the Norton electrical shops.

As Mr. Norton's chief factotum and only clerk or salesman, it fell to my lot to take Mr. Minot's orders for materials and apparatus. I thus became quite well acquainted with him and was fortunate enough to win his regard which was exhibited in his becoming my sponsor and guardian when my parents decided to return to their Virginia home, and after much persuasion accorded their permission for me to remain in New York. Not until my mother had seen and conversed with Mr. Minot did I secure her consent to the separation, and not until Mr. Minot had promised to give me employment on the New York and Erie telegraph line as an operator, and assume the role of guardian and mentor of the callow youth of sixteen, would either of my parents consent for me to remain.

The morning after my parents took the train for Virginia I reported to Mr. Minot, who gave me a pass and orders to report for duty to Superintendent Charles Loring Chapin at Piermont, N. Y., then the eastern terminus of the Erie road, as his assistant in that office.

For the next two or three years Mr. Minot took a real fatherly interest in my welfare. At stated intervals I would be handed a communication from him enclosing a pass and instructions for me to turn my office over to the bearer, and report to him in New York forthwith. At first with sad misgivings as to the reasons for the order, I would return to the great city to receive from Mr. Minot a warm and kindly welcome, and the gratifying information that he thought I deserved a little recreation and wanted me to spend a week or ten days there with him. During each of these visits Mr. Minot would make me board and lodge with him, and every few nights I would be treated to a concert or theatrical performance, and usually return to my duties with a new suit of clothes forced on me by his generous bounty.

Frequently, however, we would spend the evenings at his rooms somewhere on Broadway, near the Irving House, I engaged in poring over his files of the London publication "Punch," while he was engaged in writing. He would, however, often kindly stop his work to answer some boyish question about the admirable skits or caricatures published in the columns of Punch in ridicule of some of the prevailing English fads and fashions, and would explain the conditions that gave them birth, thus displaying his native kindliness of heart and disposition, and arousing in my mind a thirst for information and in my heart a love that has never abated. He was certainly kind and good to the lonesome and homesick boy who was for the first time in his life released from his mother's apron strings, and who sadly needed the sustaining influences of a kindly heart and hand to encourage him in his fight for a correct and independent manhood.

While unable to do all I would like in furtherance of the praiseworthy enterprise of erecting to Mr. Minot at Turner's, a monument in commemoration of his historical telegraphic train order, I will enclose herewith my mite—$1—in aid of the enterprise, only regretting that I am not able to defray the entire expense of the project. In my gratitude to a whole-souled benefactor I would do it if I could.

While the story about Mr. Minot transmitting the first telegraphic train order from Turner's is historically correct, the first use made of the telegraph for the preconcerted movement of a train of an inferior class in the teeth and time of a delayed train of a superior class, was not undertaken for several years after. That occurred on the Susquehanna Division of the New York & Erie road and the orders were transmitted from the office of Division Superintendent D. C. McCallum, at Owego, to the train crew at Hornellsville, where the time-table then in force provided a meeting place for the east-bound stock express, second class, and the Cincinnati express, first class, but which meeting was arranged by telegraph to take place, and did take place several hours later at Owego.

But I have told of that circumstance and many others of that early railroad and telegraphic period in my "Reminiscences."

I had lost all recollection of Mr. Minot's personal appearance, but his portrait in your journal brings it all back to me, in spite of the lapse of almost sixty years since I saw him. My last interview with him must have been in 1857 or 1858, just before I returned to my Virginia home to remain, and that was just in time to witness and participate in the stirring scenes enacted on the soil of the Old Dominion from 1861 to 1864. Through all these years the names of Charles Minot and D. C. McCallum have been kept fresh and green in my memory. They were both good and helpful friends to the helpless and otherwise friendless boy.

According to the records on file in our office Mr. Charles Edward McCluer, the author of the foregoing article, was born in Indianapolis, Ind.,

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March 28, 1836. In the spring of 1852 he entered the telegraph service for the New York and Erie Railway (now the Erie Railroad) at Piermont, N. Y., which was then the eastern terminus of the line. During the next three years he was operator and depot agent at various places along the Erie road, and between 1855 and 1857 he served as operator on the Virginia and Tennessee Railway at Central Depot, Montgomery County, Va. He afterwards became auditor of transportation accounts and superintendent of telegraph for the Virginia Central Railway, now the Chesapeake and Ohio Railroad, with headquarters at Richmond, Va. When Virginia passed the ordinance of secession Mr. McCluer volunteered with his command, the First Company of the Richmond Howitzers, and went into camp with them, but was a few days afterwards detailed by Governor Letcher (Honest John), for special duty with the Virginia Central Railway Company and was never permitted to bear arms in the field. During the civil war Mr. McCluer was superintendent of supplies for the Confederate Telegraph Company, with headquarters at Richmond. After the war he filled the positions of operator at Richmond and Knoxville, and in 1867 was appointed manager of the Western Union Telegraph office at Lynchburg, Va. In 1880 he became superintendent of the first district of the Southern Bell Telephone and Telegraph Company and manager of the Richmond, Va., exchange. He left the service of this company in 1900 to become manager of the Independent Telephone Exchange in Richmond, and on the absorption of this company by the Bell interests, in 1902, Mr. McCluer found himself out of employment. In 1903 he moved to Norfolk, Va., where he and his son started a business as electrical engineers and contractors. At the end of a year the business was closed up. Since that time Mr. McCluer has been engaged in various employments outside of the telegraph.

QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. Having completely covered Mr. Jones' book we will now take up "The Quadruplex," by Maver and Davis, and bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER II.

Of what two duplexes is the quadruplex a combination?

What are the four main instruments used in a quadruplex?

What is the function of the single-current transmitter?

What is the function of the pole-changer?

What is the function of the neutral relay, and of the polar relay?

How are both relays wound?

How can a bar of soft iron be made a magnet?

How is the polarity of a magnet determined?

What happens when the current ceases?

If two equal currents are caused to pass around the iron bar in opposite directions, what is the effect?

Describe the principles employed in the Stearns differential system?

What is the office of the transmitter in the Stearns duplex?

What other name is frequently given this instrument?

Does the transmitter substitute the battery for ground and vice versa without an actual break in the circuit?

Does the home battery have any effect upon the coils of the home relays?

What is the effect of placing a battery in circuit at the other end of the line?

What is the object of the duplex and quadruplex?

What is an artificial line?

What is the artificial line used for in duplexing and quadruplexing a wire?

What is the name of the instrument used in providing artificial lines?

What is the instrument used for?

How are coils of a rheostat connected to the brass discs?

What is the effect of inserting a plug between two discs?

How are the resistance coils wound, and why?

How is a wire with a given resistance balanced by the rheostat?

When the weather is wet what is the effect on the line resistance, and how is this change compensated on the rheostat?

Why is it necessary to change the artificial resistance to make it correspond with the line resistance?

What would be the effect if a balance between the artificial and line resistances was not preserved?

What do the figures on the brass discs of a rheostat indicate?

If an insulated conductor is electrified what is the effect upon surrounding objects?

What is induced electricity?

What substance permits of the least inductive effect to take place through it?

What substance permits the greatest effect?

What is the effect of bringing the plates, or surfaces of a condenser, closer together?

How are condensers generally constructed?

What insulating substance is used to separate the sheets of tinfoil in a condenser?

What is meant by the "capacity" of a condenser?

How is the capacity of a condenser varied?

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Track Circuit Installation and the Care of Batteries.

Mr. C. G. Stecher is the author of an article in *The Signal Engineer* on the subject named in the heading. We reproduce the portion relating to the care of gravity batteries:

When setting up gravity batteries for new track sections it is usually not necessary that they should be of full strength at once and the cells can be connected to the track and allowed to work up gradually. However, if they are to be put in operation and used to energize the track relays within 48 hours they must be short-circuited before being connected to the track. When setting up or renewing battery the glass jars should be handled carefully, and should not be set or pushed around on gravel or rock ballast. If this is done jars are frequently scratched, and cracks may be the result within a short time. The proper care of track batteries is of the utmost importance. Neglect of this work in any manner or form means signal failures. They must be cleaned every two to three weeks, the interval being dependent on the ballast conditions, and on the density of traffic or train movements. If ballast conditions are poor or the track is short-circuited by trains at short intervals, zinc sulphate solution forms very rapidly and the cell quickly becomes dirty, consequently will require attention at shorter intervals than if the external resistance were high. Only one cell at a time must be disconnected, so that the circuit is not interrupted. The zinc must be cleaned and some of the zinc sulphate solution removed, and the zinc is then replaced and connected, and the jar refilled with fresh water. The density of the solution of track cells should be from 18 to 25 deg. on a gravity battery hydrometer, and it should never be allowed to reach above 30 deg. This is especially important during wet weather on other than clean rock ballast. It has been found in actual practice that on relays which failed during wet weather, the solution of the batteries tested from 30 to 38; the batteries were then adjusted to below 30 with the result that the relays then picked up. If the density is allowed to go to 30 or over and wet weather sets in, it increases to 35 and above very quickly on account of the low external resistance. The voltage of the cell is then very low and the internal resistance comparatively high.

As the zinc is consumed it should be lowered by its hangers so as to maintain the same distance between it and the copper as there is between a new zinc and the copper. By this means the internal resistance is maintained as low as is practicable.

When renewing cells the jars should be well washed, and scoured, if necessary. The loose copper should be separated from the copper element, which is then placed in the bottom of the jar. On a new copper of the usual pan-bottom type the four corners should be turned under completely so that the copper plate will lie flat against the bottom of the jar and, also, so that it can be removed easily from the jar. If a space is left between the bottom of the jar and the copper plate there is a tendency to cause crystallization. Clean blue vitriol should be placed on top of the copper and fresh water then poured into the jar to within about 1½ inches of the top of the jar, the zinc put in place, and the jar then filled up with clear zinc sulphate solution taken from the top of the old cell—this in order to start strong chemical action and have the cell available for service at once.

The blue vitriol which is left in the cells when they are taken out of service should be thoroughly washed, freed from all metallic copper and then used again. This should be placed on top of some new clean blue vitriol. The loose copper should be gathered up for shipment, as it is of considerable value.

The zinc sulphate solution must not be poured on the blue vitriol, but the fresh water must be poured in first, otherwise crystallization may set in. This condition may also be induced, if old, dirty, unwashed, blue vitriol is placed in the bottom of the new cell, or if blue vitriol is added while the cell is in service and is nearly exhausted—a practice which should not be permitted. It should be remembered that the voltage of a gravity cell is highest when there is a preponderance of copper sulphate, i. e., blue vitriol solution; as the amount of copper sulphate solution decreases and the zinc sulphate solution increases, the voltage decreases. The current output is dependent on the size of the zinc, the distance between the zinc and the copper, and the resistance of the solution. Zinc sulphate solution offers less resistance to the flow of current than copper sulphate solution. If the distance between the zinc and the copper is decreased the internal resistance is decreased, and the current output thereby increased. However, a distance of at least 2½ in. to 3 in. should be maintained between the two elements, otherwise short circuits may be the result, due to the formation of stringers of dirt and copper between the two elements.

Annual Convention of the A. I. E. E. at Chicago.

The annual convention of the American Institute of Electrical Engineers will be held at Chicago, Ill., June 26-30. The headquarters will be at the new Hotel Sherman. The Meetings and Papers Committee has arranged an attractive programme of technical papers on a wide variety of subjects.

President D. C. Jackson has appointed the following convention committee which will have charge of the local arrangements: Messrs. Louis A. Ferguson, chairman; W. L. Abbot, B. J. Arnold, H. M. Byllesby, W. L. Campbell, T. P. Gaylord, W. B. Jackson, J. W. Johnson, John D. Nies, W. P. Sidley, B. E. Sunny, Fay Woodmansee, P. B. Woodworth and J. G. Wray.

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Radio-Telegraphy.

Wireless in Labrador.—The Newfoundland government has instructed the Marconi Wireless Telegraph Company of Canada to proceed with the erection of two small power stations at Makovick and Cape Harrison, Labrador.

Wireless Equipment for the Khedive's Yacht.—The yacht "Mahroussa" belonging to the Khedive of Egypt will be equipped with a wireless telegraph outfit of 5 k. w. capacity, which will have a working range under normal conditions of about 250 miles over sea.

Wireless in Turkey.—The Turkish government has closed a contract for the equipment of eleven ship stations and one shore station at Constantinople of 20 h. p. capacity. The latter will have a range of 620 miles which will transmit five wave lengths ranging from 600 to 2,000 meters.

Wireless on Whaling Vessels.—Several vessels of the American whaling fleet operating in Alaskan waters have been equipped with wireless outfits so that they can communicate with wireless stations along the coast. There are now 121 vessels plying along the Pacific coast that are equipped with wireless apparatus.

Wireless Signals from Eiffel Tower.—It is stated that wireless signals from the Eiffel tower, Paris, by the use of singing sparks have been clearly heard by the Glace Bay station in Canada, a distance of over 3,000 miles, with an expenditure of energy at the Eiffel tower of only 13 horse-power. The French Radio Electric Company of Paris operates the system.

Marconi's Wireless Telegraph Company.—At the recent annual meeting of the Marconi's Wireless Telegraph Company of America, Mr. Godfrey C. Isaacs, managing director of the Marconi Company in London was added to the board of directors and Mr. Chas. A. Terry of New York and Major S. Flood Page, of London, were re-elected directors to serve for five years.

Wireless Train Telegraphy in Prussia.—The administration of the Prussian railroads has been experimenting with a system of wireless train telegraphy between Berlin and Beelitz. It appears from the account at hand that the train is not equipped with transmitting apparatus but only for the reception of signals. The transmitting station is located between Berlin and Sangerhausen. A special wire is suspended upon the telegraph poles alongside the road and the train receives the signals from it through the air.

Wireless Telegraphy in the Arctic Regions.—The Norwegian government will establish wireless telegraph stations at Christiania, Mandal, Bergen, Hammerfest and Spitzbergen, which will give wireless communication over a large area of the Arctic circle. By means of these stations Norway will be kept in touch on the South with the coasts of Denmark, Germany and Holland; on the West with England and Scotland; and on the East with Russia. Communication will be established with polar waters through the Hammerfest and Spitzbergen stations.

Secret Wireless Telegraphy.—Captain Hovland, of the Norwegian navy, recently read a paper in Berlin describing his system of cipher language combined with the rapidity of ordinary transmission. The transmitting apparatus resembles a typewriter. A definite number of contacts are closed for each letter by the pressure of the key, and a number of current impulses proceeds from the contacts. The characteristic of the Hovland system consists, however, in the circumstance that the apparatus can be disarranged by means of a special cryptographic contrivance. The disarrangement of the apparatus leads to the dispatch, not of the current impulses which actually correspond with the individual letters, but of other definite impulses according to the combination which may be chosen. It is, of course, necessary for the receiving station to set its cryptographic contrivance according to the same combination, and the current impulses received are then transformed automatically again into those which correspond with the original letters. The letters in the case of the latest apparatus are at once printed in type on paper strip. The system is to be introduced in the Norwegian navy, and the German Telefunken Company is reported to have acquired the patents.

Sir W. H. Preece on Wireless Telegraphy.

Sir William H. Preece, the well-known English telegraph engineer, made an address recently before the South African Institute of Electrical Engineers at Johannesburg on "Some Aspects of Theory." Referring to wireless telegraphy he said: "The ocean acts as a directive agent and simplifies very much the working of wireless telegraphy on board ship. The waves hug the surface of the water. Thus also the curvature of the earth is harmless. But the electric waves diverge in space in every direction. They spread out and diminish in voltage and amplitude rapidly, so that the effect of distance has to be overcome by increasing the energy expended in making the waves. It requires, as a rule, one kilowatt per 100 miles lineal to cross the surface of the ocean.

"Mr. Marconi has discovered a great difference of range of signaling between night and day. The ratio is sometimes 3 to 1. While he has signaled 1,500 miles at night, he has had difficulty in signaling more than 500 miles by day. This is supposed to be due to the electric waves flowing in the upper regions of the atmosphere encountering free electrons and dissociated ions, due to the passage of the ultra-violet rays of the sun. It is quite an acceptable explanation, but it is also a proof of the character of electricity as a form of energy."

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The Railroad.

Mr. E. A. Chenery, superintendent of telegraph, Missouri Pacific Railway, St. Louis, Mo., was a recent New York visitor.

Mr. A. C. Kellar, a former telegrapher, has been appointed superintendent of the Sierra Railway of California, with headquarters at Jamestown, Cal.

Mr. John W. Daly, a former telegrapher, has been appointed traffic manager of the New York Central Lines west of Buffalo, with headquarters at Chicago.

Mr. E. J. Little, superintendent of telegraph, Great Northern Railroad, St. Paul, Minn., and W. F. Williams, superintendent of telegraph, Seaboard Air Line, Portsmouth, Va., were recent New York visitors.

Telephone Train Dispatching on Lehigh Valley.—The Lehigh Valley Railroad is equipping the east end of its Buffalo division for telephone train dispatching, under the supervision of Mr. J. F. Caskey, superintendent of telegraph.

Train Dispatching on Santa Fe.—The mileage of the Atchison, Topeka & Santa Fe system on which trains are directed and dispatched by telephone is 6,374 miles. Mr. L. M. Jones, Topeka, Kan., is the superintendent of telegraph of this system.

Train Dispatching on Chicago, Milwaukee & Puget Sound Railroad.—The Chicago, Milwaukee & Puget Sound Railroad is installing a telephone dispatching system on 755 miles of its line, between Mobridge, S. D., and Leer Lodge, Mont. Mr. U. J. Fry, Milwaukee, Wis., is superintendent of telegraph of this system.

The Railophone.—The "Railophone," which is attracting much attention in England just now, is a wireless system of communicating with moving trains, and has been briefly referred to in these columns. A few more details of the system have come to hand. It comprises essentially a large rectangular coil of wire, wound round the frame of a railway coach, and a single insulated wire carried alongside the railway track, at any distance up to thirty feet from the latter, and either aerial or underground. The necessary transmitting and receiving instruments are fixed respectively in the coach and in a signal box or at a station. Communication is effected by electromagnetic induction between the coil and the stationary wire, the circuit of the latter being completed via earth. In practice two coils are carried on the coach, one for receiving and the other for transmitting messages. Communication is easily effected, whether the train is at rest or in motion, and it is stated that conversation can be carried on between two moving trains on the same railway. A novel feature of recent introduction is a sensitive relay, which can be actuated by induction from the stationary wire, and thus would enable the engineer on one train to put the brakes on another running on the same line of rails, thus averting a possible collision. The system is being exploited by International Railophones, Ltd., Birmingham.

The Boston Meeting of the Railway Telegraph Superintendents.

Secretary P. W. Drew of the Association of Railway Telegraph Superintendents is sending out to the members a circular letter giving information regarding the next annual convention of the Association at Boston, June 26 to 30. The first session will be called to order at 1.30 p. m. Monday, June 26, thus giving the members an opportunity for social intercourse during the morning of that day.

The headquarters will be at the Hotel Brunswick, and the hotel rates will be: Single room without bath, $2.00 to $3.00 per day, and with bath, $2.50 to $4.00 per day. When the same room and bed are occupied by two people an extra charge of $1.00 per day will be made. Reservations should be made from Mr. Herbert H. Barnes, The Brunswick, Copley Square, Boston, Mass. All those who intend to make an exhibit of appliances are requested to correspond with the hotel direct.

If any of the members wish to use the Rome and Ogdensburg Navigation route between Toronto and Montreal at reduced rates, they are requested to correspond direct with Mr. Wm. Marshall, superintendent of telegraph, Canadian Pacific Railway, Toronto, Ont.

The Boston meeting will probably be the largest one in the history of the Association and many very interesting papers will be presented and discussed. Mr. S. A. D. Forristall, superintendent of the Boston and Maine Railroad, Boston, is chairman of the entertainment committee. This committee will provide some special features of enjoyment for the ladies and guests of the members and for the members themselves between sessions.

Three amendments to the constitution will be submitted for action at this meeting. A new article to the constitution will also be proposed regarding the submission of various questions pertaining to the railway operations as recommendations to the American Railway Association.

Telegraph in Argentine Republic.—The government telegraph plant of the Argentine Republic comprises 650 offices, 15,900 miles of pole line and 39,370 miles of wire. Private companies operate 1,892 offices, 20,725 miles of pole line and 69,017 miles of wire. On the government lines Morse apparatus is used, single and duplex; the Wheatstone system is also in operation, both single and duplex, also a quadruplex circuit. The quadruplex is the invention of Mr. Augustin Sal, Inspector-general of government telegraphs, Buenos Ayres. It works on a circuit of 217 miles of iron wire 4.5 millimeters in diameter of 4,000 ohms resistance, and will work on a similar wire 375 miles in length. Mr. Sal states that the No. 2 side works as fast and as smoothly as does the No. 1 side, there being no broken signals.

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Turner Monument Fund.

At the Boston meeting of the Association of Railway Telegraph Superintendents, June 26-30, the Turner monument project will receive especial attention. It was at the last meeting of the association, in Los Angeles, Cal., in June, 1910, that the idea was put into concrete form and launched into existence. The movement was later endorsed officially by the Old Time Telegraphers' and Historical Association at its annual meeting in Chicago, September 8-10, 1910, and a joint committee composed of members from both organizations was appointed to solicit subscriptions to defray the cost of the monument, which will be about $3,000. Up to the present about $1,600 have been received toward the fund, and it is expected that the balance will speedily be provided.

The committee in charge of the monument fund consists of: E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

In our issue of May 1 we acknowledged the receipt of $155 from Mr. C. F. Ford, of Central Valley, N. Y., from 145 employes of the Harriman Estate, at Harriman, N. Y. The following is a list of the individual contributions which made up this amount: C. F. Ford, $5.00; Richard Rose, $1.00; J. B. Ford, $1.00; G. W. Birdsall, $1.00; G. H. Wilkes, $1.00; C. E. Jones, $1.00; I. W. Maudiyo, $1.00; C. Herbert Ford, $1.00; Robert Weyant, $0.50; W. B. Wilkes, $0.50; John Potter, $1.00; F. B. Burgess, $1.00; H. C. Thorne, $1.00; J. Kock, $0.50; R. Grunott, $0.75; H. Totter, $0.75; C. Kauptot, $0.75; A. Lamprecht, $0.50; A. Rominy, $0.25; F. Detlef, $0.50; F. Hilzinger, $0.50; A. Puggiotto, $0.50; Cris Buff, $0.50; C. Magliola, $0.50; D. Bernard, $0.50; C. Robertson, $0.50; C. Drening, $0.50; A. Eleisburg, $0.50; Ray Pfister, $0.50; F. V. Custard, $1.00; H. Kamphauser, $1.00; J. E. Corley, $0.50; T. Gregory, $0.50; Wm. Thom, $1.00; Chas. Kansen, $0.50; E. Wahner, $1.00; E. B. Anderson, $1.00; Frank Conklin, $0.50; Nick Clark, $1.00; R. F. Weygant, $1.00; A. Treptri, $1.00; Jas. Potter, $1.00; Nelson Degraw, $0.50; Edw. Dunn, $1.00; H. Bullwuckle, $1.00; M. Fahlman, $1.00; A. H. Walsh, $1.00; R. Bullwuckle, Jr., $1.00; Frank Decker, $1.00; Bert Jones, $0.50; F. Schroon, $1.00; M. Mazzone, $1.00; G. Marcksino, $1.00; Vincent Viscidy, $1.00; P. Aliano, $1.00; H. Knapp, $1.00; G. Kreies, $1.00; J. S. Baird, $1.00; A. H. Travers, $1.00; Reuben Ayres, $0.50; B. King, $1.00; C. A. Solman, $1.00; F. E. Wooly, $1.00; Valentino Dubburo, $0.50, all of Central Valley, N. Y.; A. D. Cole, $0.50; a mason friend, $1.00; C. Post, $1.00; M. Weyant, $1.00; a mason friend, $0.50; Jack Redner, $1.00; Thos. Turnbull, $1.00; E. Heiniske, $2.00; B. Stein, $0.50; A. Mielert, $0.50; A. W. Henning, $0.50; H. Schmock, $0.50; H. Veith, $0.50; S. D. Gordon, $1.00; D. Turnbull, $1.00; J. Conklin, $0.50; Geo. King, $1.00; Alf. Moshes, $1.00; R. Herbert, $1.00; A. Shire, $1.00; C. Hollman, $1.00; Geo. Bowen, $1.00; Frank Ballard, $1.00; F. A. Schultz, $1.00; Thos. Baird, $1.00; W. Berry, $1.00; Geo. Cruickshank, $1.00; J. B. Otis, $2.00; W. H. Crane, $1.00; I. Ellis, $1.00; V. Troiano, $0.50; W. B. Birdsall, $2.50; J. E. Myer, $2.50; T. B. Earl, $2.00; Moses Beal, $1.00; Chas. Carpenter, $1.00; cash, $1.00; J. S. Conklin, $1.00; I. D. Smith, $1.00; W. Goodfellow, $1.00; J. A. Cornelius, $1.00; Thomas Monhan, $1.00; Charles Beams, $1.00; J. Babchak, $0.50, all of Harriman, N. Y.; B. F. Shuit, Monroe, N. Y., $1.00; E. P. Schultz, $1.00; I. T. Hunter, $1.00, Highland Mills, N. Y.; C. E. Alduci, $1.00; C. H. Howell, $1.00, Cornwall-on-Hudson, N. Y.; C. E. Weeks, $0.50; H. W. Green, $0.50, Highland Mills, N. Y.; E. P. Runyon, Vails Gate, N. Y., $1.00; H. Hunter, $0.50; Theo. Barton, $0.50, Highland Mills, N. Y.; Chas. Hinn, $1.00; C. Johnson, $1.00, Cornwall, N. Y.; A. Eversin, $1.00; S. P. Shelling, $1.00; Gus. Johnson, $1.00, all of Newburgh, N. Y.; E. D. Taylor, $0.50; A. J. Wells, $0.50, Highland Mills, N. Y.; D. W. Wenker, $1.00; Ted Viner, $0.50; A. G. Klock, $1.00; W. A. Viner, $1.00, Arden, N. Y.; Edw. Hand, Cornwall, N. Y., $1.00; C. C. Rumsey, $25.00; A. B. Schoonmaker, $1.00, Arden, N. Y.; J. F. Gaylor, New York, $1.00; F. Keishaw, Highland Mills, N. Y., $1.00; J. Kopchak, $1.00; Pasgalo Maguyo, $1.00; Walley Ventura, $1.00; Giovanni Ventura, $1.00; Chas. Ventrano, $1.00; Jimmy Di Donato, $1.00; Brionauito Commak, $0.50; John Flovian, $1.00; Carrlo Coipakfere, $0.50, all of Sloatsburg, N. Y.

Contributions received up to date are as follows: Previously acknowledged, $1,544.25. Okonite Company, New York, $50.00. Total, $1,594.25.

Mr. H. A. Tuttle, president and general manager of the North American Telegraph Company, Minneapolis, Minn., in renewing his subscription for another year writes: "I certainly shall take great pleasure in recommending Telegraph and Telephone Age to any of my friends interested in this kind of business. I greatly enjoy the paper, now, as I have for many years in the past. I wish you every success."

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Study of the Quadruplex.

The duplex and quadruplex of today are, in principle, the same as they were in the beginning, the differences being largely due to refinement of details. An excellent book on the quadruplex is that of Maver and Davis', "The Quadruplex," which was published many years ago but which is still a valuable work on the subject. The chief feature of the book is its easy method of describing the principles underlying the duplex and the quadruplex, and after these have been mastered the minor differences in the present day instruments can be readily understood.

In our department headed "Questions to be Answered" we are now using "The Quadruplex" as a basis for questions, in the same manner as was done with Jones' book of diagrams.

Besides the duplex and quadruplex the Wheatstone system of telegraphy is fully described and illustrated, and a chapter on repeaters gives a very clear explanation of the principal repeaters in use in this country.

From the chapter headings an idea of the scope of the work may be obtained. Chap. 1. Development of the Quadruplex; 2. Introduction and Explanatory; 3. The Transmitter, Rheostat and Condenser; 4. Stearns Duplex; 5. Instruments of the Polar Duplex; 6. The Polar Duplex; 7. The Quadruplex; 8. The Dynamo-Electric Machine in Relation to the Quadruplex; 9. The Practical Working of the Quadruplex. The two last chapters are on Telegraph Repeaters and the Wheatstone Automatic Telegraph. Copies of this book may be obtained at $1.50 each by addressing Telegraph and Telephone Age, 253 Broadway, New York.

"Touching" the Western Union.—The Western Union Telegraph Company is now good for a "touch," is the way some of the employes refer to the company's recent loan order.

The Yaquy Delta Land and Water Company has been incorporated at Dover, Del., with an authorized capital stock of $12,000,000. It will enter Mexico with railroad and telegraph lines.

The Edison Storage Battery.—Mr. Frank L. Dyer, for many years in charge of Mr. Thomas A. Edison's patent and business interests, presented a paper on "The Edison Storage Battery—Its Production and Application," before the New York Electrical Society May 18th.

Duty on Glass Insulators.—The Board of United States General Appraisers at New York decided recently that colored glass insulators in contradistinction to insulators colored are subject to a duty of 45 per cent. ad valorem instead of 60 per cent., thus reversing the appraisal of the Collector of Customs.

Philadelphia Local Telegraph Company.—At the annual meeting of the Philadelphia Local Telegraph Company, Philadelphia, Pa., Mr. Theo. N. Vail was elected president; Mr. Belvidere Brooks, vice-president; Mr. John W. Reed, general manager, and Mr. William P. Wheatland, secretary and treasurer.

The Child Labor Law Applied to Operators.—It appears that some of the states in enforcing their laws against employing messenger boys under eighteen and twenty-one years to deliver messages after 9 p. m. have enlarged their authority to include telegraph operators. Some telegraphers slightly under eighteen years of age have been denied the right to work at night, and others under twenty-one years have been prevented from working in the evening in states where the laws prohibited such employment. A night operator in an eastern city nearly lost his position recently because it was thought that he was not eighteen years of age. An agent of the department of public instruction investigated the matter and it cost the taxpayers a little money to find out that the suspect was in reality over eighteen years of age.

An American Consul in Amazonia is the title of a new book by Major J. Orton Kerbey, the well-known old-time and military telegrapher and ex-United States Consul at Para, Brazil. It is an interesting story of Major Kerbey's experiences and observations of South American life during his stay at Para as United States Consul. He describes the country and the customs and character of the people in a wealth of detail. The book is dedicated to Mr. Andrew Carnegie of whom there is a frontispiece in sepia tint. Major Kerbey is an easy and pleasant writer, and his story of life on the equator makes an exceedingly interesting narrative. He has illustrated his book very liberally with Brazilian views and portraits. The work contains 370 pages and is sold at $2.50 per copy. Copies may be obtained through Telegraph and Telephone Age, 253 Broadway, New York.

Old Timers' and Military Telegraphers' Convention.—The Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps will hold their joint convention at Atlantic City, N. J., September 5, 6 and 7, and a large attendance is looked for. Active preparations are being made to make the meeting a success in all respects and the secretaries of both organizations are busy on the plans. The headquarters will be at the Marlborough-Blenheim, which is one of the finest hotels at that famous seaside resort. Col. W. B. Wilson, Holmesburg, Pa., is president of both associations, and Mr. F. J. Scherrer, 30 Church Street, New York, is secretary of the Old Time Telegraphers' and Historical Association. Mr. David Homer Bates, 658 Broadway, is secretary of the Society of the United States Military Telegraph Corps. Mr. G. W. Deetz, manager of the Western Union Telegraph Company, Atlantic City, N. J., is a member of the executive committee and has charge of many of the local arrangements.

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Obituary.

W. F. Burton, aged 45 years, formerly operator at Nashville, Tenn., died at that place May 11.

Geo. F. Lehmer, aged 64 years, formerly manager of the Western Union Telegraph Company at Omaha, Neb., died May 17.

Wm. J. Lee, aged 40 years, operator for the Associated Press and Western Union Telegraph Company at Washington, D. C., died in that city May 20.

Frank J. Brown, aged 60 years, formerly train dispatcher for the Michigan Central Railroad, at Jackson, Mich., died at Ypsilanti, Mich., April 28.

Samuel J. Dennis, aged 69, formerly connected with the auditing department of the Western Union Telegraph Company, New York, died on May 15.

G. J. Lawrence, a retired business man of Albion, N. Y., an old-time telegrapher, and a member of the United States Military Telegraph Corps, died in that place May 10, at the age of 76 years. This is the fifteenth death in the membership of the United States Military Telegraph Corps since the Chicago reunion last year.

William Macfeely, who died in Washington, D. C., February 6 last, was one of the early telegraph operators in the national capital, having commenced the work in 1854, when he was eighteen years of age. He remained with the telegraph company about seven years, and then entered the service of the government, in which he continued up to the time of his death. For more than forty years he held a responsible position in the Treasury Department. He was never married. The interment was at his native place, Carlisle, Pa.

Annie Elizabeth Clark, wife of Dr. James J. Clark, Washington, D. C., an associate of Prof. S. F. B. Morse, died in Washington, May 23. Dr. Clark is one of the few men who were intimately associated with Prof. Morse in the work of developing his telegraphic inventions. Dr. Clark's father was a skillful and successful mechanician and clock maker in Philadelphia, and young Clark was his partner and successor. They devised the first register with solid side plates, supporting all the working parts, a plan universally followed thereafter. They also made the "harp register," the design for which was drawn by the late J. D. Reid in their shop. Dr. Clark has always retained his interest in telegraph matters and is widely known among members of the fraternity and is an occasional contributor on historical matters in these columns.

Martin W. Barr, a forty-niner of the telegraph, and a well-known newspaper man in Washington, D. C., died in that city May 11, at the age of 84 years. Mr. Barr entered the telegraph service at Wheeling, W. Va., in 1847 and later in the same year he opened the first telegraph office at Columbus, Ohio. In 1848 he was placed in charge of the Louisville, Ky., office of the Louisville and St. Louis Telegraph line, which position he held until 1855, when he resigned to enter the newspaper field. He enlisted in the Confederate army during the civil war and received the rank of major, his duties being to intercept the news of the northern army. Mr. Barr was connected with the Southern service of the Associated Press at Washington for many years and afterwards held a position as proof-reader in the Government printing office. He retired from active service several years ago. Mr. Barr was a man of gentle nature and was highly esteemed by those who knew him.

The Late Fred Catlin.

BY W. H. ALLEN, WASHINGTON, D. C.

The article in your issue of May 1 respecting the passing away of our old friend, Fred Catlin—one of the best of fellows and as fine a telegrapher as ever touched a Morse key—recalls an incident in which Mr. Catlin figured, the other participant being Mr. P. V. De Graw, now fourth assistant postmaster-general at Washington, D. C. It was in the seventies. De Graw and Charlie Moore were the Philadelphia night regulars on the New York-Philadelphia short wires, and Mr. George M. Eitemiller and Mr. Walter P. Phillips manned the two circuits at the New York end. Between 6 and 9 p. m. daily several hundred private messages and cables were exchanged on these two circuits, and the caliber of these men is sufficient proof that the circuits were worked about the fastest of any out of either office. As the boys used to say in referring to these wires, "Morse is clipped to a finish."

The incident referred to happened one night when Mr. Phillips was away and a new man, a stranger, was put on one of the wires to send to De Graw. Matters did not run smoothly and the late Tom Dolan, the night manager at New York, gave the wire especial attention. Noting several breaks by De Graw, he called upon the night chief in the Quaker City, the late J. E. Zeublin, for an explanation, remarking that the business was not being worked off with the usual facility. Zeublin listened; noticed the breaks upon the part of the receiver, De Graw; stepped over and in his usual lovable manner asked of De Graw what was the trouble. De Graw replied, "No trouble, except that I cannot read the sending."

"Let me try it," said Zeublin, who sat in without giving the relief sign. He found it impossible to decipher the peculiar sending and reported the facts to Manager Dolan, adding: "If you have any real good senders over there put one on that wire and I will guarantee that the business will be handled with dispatch." Dolan said he thought the trouble was with the receiver, "but," he added, "we shall see. I will put a man on there who will clear the wire in thirty minutes. Now it is up to your end to do your part."

"All right," replied Zeublin, "let 'em come."

A moment later Fred Catlin at New York asked of Philadelphia, "Who's there?" "De," was the reply. "Hello old boy," said Catlin, "what's the matter; this circuit is piled up and I have instructions to clear it up in half an hour. Are you ready?"

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"All ready, go ahead," was the reply.

Catlin ran off twenty-eight messages as they came, long and short, in twenty-five minutes, without hearing a sound from Philadelphia and then closed his key. "De" was the only signal that came back, indicating that the messages had been received all right.

It turned out that Dolan and Zeublin had cut in and listened to the work, and both chiefs assured young De Graw that he was all right, and that the circuit should thereafter always be manned with "Morse clippers." And so it was.

Mr. De Graw's version of the incident is that it was only a question of being able to drive a rapid pen, as there could be no criticism of the Morse characters employed by Catlin, they being simply perfect. "In my judgment," said Mr. De Graw recently, in reference to this matter, "Fred Catlin, Bert Ayres, Eddie Boileau, and George Eitemiller were in those days the finest Morse senders in the world."

Decorating the Morse Statue.—The statue of Prof. S. F. B. Morse, in Central Park, New York, was, as usual, decorated on Memorial Day. Mr. M. H. Kerner, of the Western Union Telegraph Company, New York, has supervised this work for the past sixteen years and he has been faithful to his trust. Hereafter the expenses of decorating the statue will be borne by the Morse Electric Club.

Trade Notes.

The Randall Telephone Manufacturing Company, which is to exploit the telephone inventions of Mr. C. Adams-Randall, New York, has opened offices at 291 Broadway, corner Reade Street.

Mr. C. Brandes, 111 Broadway, New York, maker of high-grade receivers for wireless telegraphy and telephony, has just issued a new pamphlet, which gives a little story on long-distance wireless receivers. Mr. Brandes will mail a copy to any address on receipt of a two-cent stamp.

Removal of Gamewell Fire Alarm Telegraph Company's Office.—The Gamewell Fire Alarm Telegraph Company, New York, has moved its executive offices from 19 Barclay Street to 30 Vesey Street. The company will occupy the entire fourteenth floor of this newly erected modern fireproof building. The officers of the Gamewell Company are: W. H. Woolverton, president; Wm. Gellatly, vice-president and general manager; Charles W. Cornell, secretary, and W. W. Bowes, treasurer.

O. R. T. Convention.—At the biennial convention of the Order of Railway Telegraphers, held at Toronto, Ont., May 8-17, all of the present officers were re-elected as follows: H. B. Perham, president; J. A. Newman, first vice-president; T. M. Pierson, second vice-president; D. Campbell, third vice-president; J. J. Dermody, fourth vice-president; L. W. Quick, grand secretary and treasurer. The present board of directors was also re-elected. It was decided to hold the next convention in Baltimore, Md., in 1913. The twenty-fifth anniversary of the Order of Railroad Telegraphers will be celebrated in Cedar Rapids, Iowa, during the present month.

T. M. B. A. Assessment.—Assessment No. 524 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Wm. H. Stevens at Buffalo, N. Y., Joseph Knittle at Brooklyn, N. Y., John Fitzpatrick at Springfield, Mass., Alfred G. Trulan at Montpelier, Vt., Samuel C. Suydam at Canandaigua, N. Y., and James M. Daniel at Georgetown, Tex.

LETTERS FROM OUR AGENTS.

ATLANTA, WESTERN UNION.

The ladies' "rest room" in connection with the operating department has been furnished with a couch, a generous number of easy chairs, etc., giving it a very cozy and homelike appearance and adding much to the comfort and convenience of the employes. The men's "rest room" has been furnished with an oak dining table, comfortable lounging chairs, a writing table, bookcase, etc. This room is also used by the classes in electricity, which are making good progress and are enthusiastically attended.

Mrs. C. E. Johnson, formerly of 195 Broadway, New York, is a recent addition to the operating force.

Messrs. E. E. Cunningham, D. Terry and F. Gittus have recently been appointed assistant repeater chiefs.

At a conference of the heads of divisions of the Atlanta operating department, held in Superintendent E. E. Williams' office, the following were present: Mr. W. C. Hair, general traffic chief; Mr. W. O. Ballard, general wire chief; Mr. T. E. Argo, general repeater chief; Mr. S. H. Woodruff, general printer chief; Messrs. W. A. Reynolds, E. Waldron, J. F. Morey, wire chiefs; Messrs. W. W. Crudden, E. T. Krebbs, E. E. Cunningham, J. P. Brown, J. L. Walling, D. Terry, F. W. Gittus, repeater chiefs; Messrs. R. E. Satterwhite, J. T. Goodrum, J. D. Prather, O. T. Hughes, traffic chiefs; Mr. E. G. Clinkscales, night repeater chief; Mr. A. H. Condra, night chief operator, and Mr. H. K. Griffin, chief operator. Each of those present was requested to voice his views as to methods for better co-operation within and without his own department; also anything which seemed to result in a benefit of the service. Numerous valuable suggestions were made.

It must be very gratifying to General Superintendent H. C. Worthen to note the enthusiastic interest taken in the company's affairs by his subordinate officials. Chief Operators F. R. Vaile of Richmond, Va., W. R. Jackins of Charlotte, N. C., D.

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G. Breed of Louisville, Ky., G. W. Hammill of Nashville, Tenn., and H. K. Griffin of Atlanta recently met at Atlanta in conference as to the best methods of maintaining closer co-operation and harmony between their respective offices; also for a comparison of working methods, etc. Each one expressed himself to have been benefited and believed a better service would result. The telegraphic spirit of Atlanta is a real live quantity and there are fifty men now in the Atlanta office who will be heard from later as electrical engineers.

Mr. B. P. Hancock, district traffic superintendent, has returned from a trip of inspection through Tennessee.

General Superintendent H. C. Worthen of Atlanta, Ga., and District Commercial Superintendent J. R. Terhune of Nashville, Tenn., made a business trip through Mississippi recently.

In regard to the electrical class organized among the Western Union employes at Atlanta, Ga., which was referred to in our issue of March 16, superintendent E. E. Williams, at that point, says: "We are glad to note that our employes are meeting our efforts half way, and we anticipate results that will be highly gratifying to the men themselves, and also to the company. Our employes in the South are waking up to the opportunity for advancement being offered by the liberal policy of the Western Union Company, which is constantly on the lookout for efficient men and women."

Mr. Williams states that Mr. Jos. Marshall, chief operator at Charleston, S. C., has started a class composed of his own subordinates, and is doing fine work.

SAN FRANCISCO, WESTERN UNION.

Mr. Frank Morris, formerly eastern and overland division chief, who recently resigned and went to Los Angeles as assistant chief operator, has resigned at the latter place and gone to his ranch near Seattle, Wash. Mr. Charles Rawlinson, formerly of Indianapolis and Cleveland, takes Mr. Morris' place as chief of the overlands.

Mr. C. E. Paine, formerly with the Atchison, Topeka & Santa Fe Railway at Los Angeles, takes the North and South coast wires. Mr. Paine has recently been acting as traffic chief nights. He is relieved by Mr. T. McGunness, formerly manager at Ogden, Utah.

NEW YORK, WESTERN UNION.

Mr. W. J. Van Slyke, for many years connected with the marine department in this office, died on May 11. Interment was at his old home in Stuyvesant, N. Y. Mr. Van Slyke was esteemed for his quiet and gentlemanly bearing.

Mr. Cyrus Cole, a veteran employe of this office in connection with "Clark's" department, died on May 10.

NEW YORK, POSTAL.

The New York Postal Electrical Society has a membership of forty and is doing excellent work under the guidance of the instructor, Mr. Donald McNicol of the electrical engineer's staff. After ten weeks' study thirty members took the examination, and twenty-three of them earned over 200 points out of a possible 270. A list of the examination questions shows a wide scope of instruction.

Martin's Double Lever **VIBROPLEX, $8.00** f. o. b. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

FOR SALE—A Bunnell galvanometer, complete in leather case, with resistance coils and connections for Wheatstone bridge measurements. Must be disposed of immediately to close an estate. Cost over $100.00. Will sell for $35.00. Address "Galvanometer," care Telegraph and Telephone Age, New York.

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.

TRANSMITTING MACHINES

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Telegraph and Telephone Age

No. 12. NEW YORK, JUNE 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

ELECTRO-THERAPEUTICS.

Electro-therapeutics is a term used to designate the treatment of disease by means of electricity, and this method of treating disease has been used with varying results as far back as means of generating electricity have been known. During the early period the method employed consisted principally in stimulating the organs of the human body by means of "shocks" produced by the discharge of Leyden jars and frictional machines. With every new method devised for generating an electric current a new way of application and treatment was tried, with the result that to-day electro-therapeutics has become a very valuable adjunct to medical science when properly handled, while at the same time it is the source of much harm in the hands of laymen.

The purpose of this article is to call attention to the too common practice on the part of the general public of indiscriminately resorting to home treatment by electricity for each and every ill with which one may become temporarily afflicted.

A few words describing the effect produced in the human body by the passage of an electric current through it should make this warning well worthy of consideration.

When a current enters the body several different effects are produced, the principal ones being magnetic, electrolytic, osmotic and cataphoric. The first two play so little a part that they may be left out of the consideration.

The electrolytic, or decomposing factor, however, is the basis of electro-therapeutics. We all know that when a fluid or solution is decomposed by a current the product of such decomposition appears only at the electrodes, yet all along the route between the electrodes there is a movement of the separated ions, the positive going in one direction and negative in the opposite. Hence when a current passes through the moist human tissue there is an electrolytic effect created therein throughout the entire route, and the aim of electro-therapeutics is to cause these migrating ions to carry into the body, and thus reach the diseased parts, medicinal solutions rubbed into the skin where the current enters. Treatment of this kind is called cataphoric and is the principal method now employed.

Now this all seems like a very simple and harmless method of cure, and one that anyone might try with impunity. But let us see what chance the layman has of deriving any beneficial result, even if he escapes actual harm.

In the first place he does not know that the electrolytic effect caused in the human body engorges certain portions of the body at the expense of depleting the fluids in others. There can be no gain in one way without a corresponding loss of strength in another. Fortunately healthy tissue can withstand considerable loss without the individual experiencing any appreciable harm, but diseased parts are readily responsive. Some such parts may require stimulation, while the stimulation of the same parts in another instance might prove fatal. How is the layman to know which remedy is correct for each particular case?

Again, assuming that he does know, how can he tell the proper volume or strength of the current required for producing good results, or how long a time to continue the treatment?

Furthermore, with his limited knowledge of anatomy, what chance has he of connecting the electrodes so that the current will actually reach the diseased parts? He does not know that the greater volume of current will be diverted through his body by the shortest path, according to Ohm's law. The result is that in the majority of cases of home treatment very little current actually reaches the diseased parts, but spreads out through other portions of the body, where it may be either harmless or dangerous, according to the conditions of the other parts coming under its influence.

During the early stages of electric treatment a certain amount of ignorance was to be expected, as everything was more or less experimental, but there is no excuse for guessing about it now. Medical batteries or magnetos are very useful, but the physician should advise their use, not the layman; they may or may not be the remedy required.

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ELECTRIC CAUTERY.

Electro-therapeutics also plays an important part in surgery. Owing to the ease with which an electric current heats a metallic wire to incandescence, advantage has been taken of this to construct surgical knife blades of platinum, which readily become incandescent when a large volume of current is caused to flow through them.

Such knives are obviously of a superior order, compared with the old style, as they cauterize the wound at the same time they cut out and remove diseased tissue.

Recent Telegraph and Telephone Patents.

ISSUED MAY 16.

992,165. Telephone System. To H. P. Clausen, Chicago, Ill.

ISSUED MAY 23.

992,791. Wireless Telegraphy. To J. F. McElroy, Albany, N. Y.

992,836. Party Line Ringing System. To C. S. Winslow, Chicago, Ill.

993,024. Coherer. To E. J. Burke, New York.

ISSUED MAY 30.

993,442. Telegraphy. To J. A. Esslinger, Washington, D. C.

993,975. Telephone Support. To Charles E. Flynn, Vale, Ore.

994,079. Telegraph Transmitter. To B. P. Hayes, Topeka, Kan.

Personal.

Miss Hattie M. L. Roth, for several years bookkeeper for TELEGRAPH AND TELEPHONE AGE, was married to Mr. H. J. A. Schneider, of New York, on June 1.

Mr. W. H. Hurst, president of the Stock Quotation Telegraph Company, New York, has returned from England where he has been on business since April.

Mr. Melville E. Stone, general manager of the Associated Press, New York, will address the meeting of the Michigan members of the association at Grand Rapids, on June 16.

Mr. Ralph W. Pope, an old-time telegrapher and for over 25 years secretary of the American Institute of Electrical Engineers, New York, is the subject of an interesting sketch in the Columbus, Ohio, *Dispatch* of May 28.

Mr. Robert T. Lincoln, president of the Pullman Company, Chicago, Ill., has resigned that office. He was subsequently elected chairman of the board of directors of the company. Mr. Lincoln is a director of the Chicago Telephone Company and is a son of the late President Abraham Lincoln.

Mr. John S. Ernest, a well-known operator of St. Louis, Mo., and formerly of Virginia, is proprietor of *The Sunday Telegraph* of that city, which is devoted to baseball and other sporting news. He also represents twelve out-of-town papers in baseball matters, and, besides, carries on other lines of trade.

Mr. Frank S. Gannon, whose office is at 2 Rector Street, New York, is an old-time telegrapher, and has held important official positions on various railroads in the eastern and southern states. Mr. Gannon devotes himself to technical work in examinations and appraisals of railway properties and as advisory counsel.

Mr. Emmett Howard, an old-time telegrapher, ex-confederate operator and manager of the Western Union Telegraph office at Memphis, Tenn., for over twenty-five years, has gone to Los Angeles, Cal., for the benefit of his health. Mr. Howard has been for the past seven years in the insurance business and his associates at Memphis tendered him a farewell luncheon prior to his departure for California.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, has returned to his office after a brief business trip to Chicago.

Mr. H. A. Tuttle, president of the North American Telegraph Company, Minneapolis, Minn., was a recent New York visitor.

Mr. E. B. Pillsbury, general superintendent, New York, was a recent visitor at Buffalo, N. Y.

Mr. A. L. Edgecomb, district superintendent at Boston, has returned to duty after an absence of several months on account of illness.

Mr. Isaac Smith, superintendent of tariffs, New York, was married on June 1 to Miss Jennie Emilio Lewis, of Jersey City, N. J.

Mr. M. J. O'Bryan, manager of the Plattsburg, N. Y., office, is on a six-months' leave of absence on account of sickness. He is relieved by Mr. C. M. Baker.

Mr. H. H. Hall, manager of the Postal Telegraph-Cable Company at Ashtabula, Ohio, is visiting New York friends and relatives.

Mr. Richard A. Shepard, assistant manager of the Poughkeepsie, N. Y., office of the Postal Telegraph-Cable Company, has been appointed manager.

Mr. J. C. McIntyre has been appointed manager of the Rome, N. Y., office, vice E. J. Nerburn, resigned.

Messrs. E. E. Heasly and T. J. Hoge, repeater chiefs, and Mr. G. W. Dull, assistant chief operator at Pittsburg, Pa., and Mr. H. L. Vincent, quadruplex chief at Boston, were recent executive office visitors.

The Postal Telegraph-Cable Company of Connecticut has qualified to do business in Vermont with office at Burlington, in charge of Mr. F. F. Bradish. The capital stock of the company is $30,000.

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The North American Telegraph Company, H. A. Tuttle, president and general manager, is erecting a new wire from Minneapolis to Chicago to better care for the increase in the company's business.

The Postal Telegraph-Cable Company is using its new copper line between Seattle and Spokane, Wash., for simultaneous duplex and telephone operation. The composite telephone system is also being installed on the company's new line between San Francisco, Cal., and Salt Lake City, Utah. The telephone is for general use.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. A. G. Saylor, general superintendent of the Eastern Division, has returned from a trip to Boston and other New England points.

Mr. T. W. Carroll, assistant to the general manager, New York, Mr. C. H. Gaunt, general superintendent, and Mr. H. F. Dodge, division commercial superintendent, San Francisco, together with several other officials of the company, visited all the important points in the Pacific Coast states recently in the interest of the service.

Mr. George M. Yorke, assistant general superintendent of plant of the American Telephone and Telegraph Company, New York, has been appointed engineer of the Western Union Telegraph Company.

Mr. W. J. Dealy, general superintendent of the Commercial News Department, New York, is rapidly recovering from a surgical operation and expects to be at his desk in a few days.

Mr. W. A. Porteous, manager of the New Orleans, La., office, accompanied by Mrs. Porteous, was a recent New York visitor.

Mr. B. F. Ragsdale, chief operator of the Augusta, Ga., office, has been advanced to the position of district manager for the state of South Carolina, with headquarters at Columbia.

Mr. George F. Stadtmiller, manager of the Erie, Pa., office, has been appointed district commercial manager of the Pittsburg district, with headquarters at Jamestown, N. Y.

Mr. J. J. Kisler has been appointed manager of the office at 174 West Street, New York, vice Mr. J. Cashman transferred to the general operating department.

Mr. D. F. Cason, former manager of the Greenville, S. C., office, has assumed the managership at Winston-Salem, N. C., vice Miss K. Mitchell, transferred to Goldsboro, N. C., Mr. J. R. Jones, manager at Goldsboro, having left the service.

Miss Estelle G. Wilson has been appointed manager of the Western Union Telegraph office at Concord, N. H., vice H. H. Morrison, deceased. Miss Wilson has been chief operator of the Concord office for several years past and the promotion is therefore a well deserved recognition of her ability.

Mr. W. D. Stead, manager of the Western Union Telegraph office at Meridian, Miss., has been transferred to superintendent Maxwell's district, with headquarters at Montgomery, Ala.

Mr. A. T. Cocke, manager of the Hattiesburg, Miss., office, has been transferred to Meridian, Miss.

Mr. J. L. Perkins has been appointed acting manager of the Hattiesburg, Miss., office.

Miss A. M. Hooks has been appointed manager of the newly-opened office at Pineville, Ky.

Miss E. G. Gillispie has been appointed manager at Winona, Miss., vice J. A. Pryor, resigned.

Mr. Charles M. Holmes has been appointed manager of the Jacksonville, Fla., office, vice C. E. Davidson, transferred to a position in the superintendent's office.

Mr. F. M. Houser has been appointed chief operator at Jacksonville, Fla., vice J. E. Rowe, transferred to Nashville.

Mr. G. W. Hammell, chief operator at Nashville, Tenn., has been transferred to Augusta, Ga.

Mr. J. E. Rowe, formerly chief operator at Jacksonville, Fla., has been appointed chief operator to succeed Mr. Hammell at Nashville.

Mr. Joseph Marshall, chief operator of the Charleston, S. C., office, has been transferred to the chief operatorship at Savannah, Ga., vice Mr. F. M. Houser transferred to Jacksonville, Fla.

Mr. H. B. Wallace is acting chief operator of the Charleston, S. C., office and Mr. W. H. Hughes is night chief operator at the same place.

The annual banquet of the Western Union Telegraph Company employes of Atlanta, Ga., was held at the Capital City Club June 8. There was a large attendance, including Mr. H. C. Worthen, general superintendent, and Mr. E. E. Williams, district commercial superintendent, Atlanta, as well as other officials of the company.

Managers from various offices in Alabama held a meeting at Montgomery, May 20, for the purpose of exchanging ideas for the benefit of the service and to become better acquainted with one another. Among those present were: S. L. Burts, district commercial superintendent, Jacksonville, Fla., and managers W. A. Sheppard, Montgomery; C. R. Hughes, Mobile; T. H. Hubert, Dothan; J. H. Purnell, Opelika; G. S. Matthews, Tuscaloosa; R. L. Smith, Talladega; O. H. Sombke, Anniston; G. R. Calvert, Birmingham; C. H. Gilbert, Huntsville; L. F. Harris, Decatur; W. A. Barrett, Gadsden, and J. M. Green, chief operator, Birmingham.

An office was opened by this company on June 1 in the Heidelburg Tower Building on Forty-second Street, New York.

The summer outing of the Morse Electric Club will be held at Donnelly's Hotel, College Point, L. I., Saturday, July 8. One of the Western Union cable steamers will be available for the use of the club to convey the members to the place of meeting.

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A new uniform for the company's messengers in all the large cities has been adopted. In general it is of military design, the cloth being of a deep blue color. The letters "W. U." are embroidered in red on the shoulder straps, and the trousers are blue with red seam-stripes. The design of the cap is a combination of the latest military and automobile patterns. In the warmer sections the boys are furnished with blouses made of blue flannel with the insignia "W. U." embroidered on each sleeve.

G. M. Yorke, Engineer Western Union Telegraph Company, New York.

Mr. George M. Yorke, the newly appointed engineer of the Western Union Telegraph Company, with headquarters in New York, is yet a young man, having been born in Lowell, Mass., on April 27, 1870. He is a graduate of the Massachusetts Institute of Technology, Boston, Mass., in the class of 1893, which institution has turned out some of the ablest engineers in the United States. Mr. Yorke's business career has been wholly devoted to telephony, and he has held various positions in the engineering and in other departments of the American Telephone and Telegraph Company, being assistant general superintendent of plant of that company at the time of his appointment to be head of the engineering department of the Western Union Company. He has had an extensive engineering experience and comes to his new position well equipped. It is interesting to note in this connection that Mr. Yorke is the first one to occupy this position, which is a newly created one.

Mr. Yorke is an associate member of the American Institute of Electrical Engineers and a member of the Franklin Institute, Philadelphia.

Mr. Charles Byrd Wade, whose appointment as manager of the Western Union Telegraph Company at Raleigh, N. C., was announced in these columns May 16, was born in Morehead City, N. C., October 30, 1884. He began his telegraphic career in the city of his birth in 1906, and afterwards worked at New Bern, N. C. His advancement to the management at Raleigh, N. C., is a fitting recognition of his ability.

Mr. William Robert Edmondson, whose appointment as district commercial manager at Jackson, Miss., was noted in our issue of June 1, was born in Nashville, Tenn., January 9, 1883. He entered the telegraph service with the Louisville and Nashville Terminal Company at Nashville on December 6, 1898, and in November, 1907, he entered the employ of the Western Union Telegraph Company. Mr. Edmondson is well fitted for his position, and his selection was made on merit.

Mr. George Heldorfer, manager of the Western Union Telegraph office at Burlington, Iowa, has a record of 42 years of continuous service at that point, having entered the office in 1860 as messenger. In 1872 he was promoted to a clerkship and in 1875 became night press operator. Five years later he was transferred to the day service as operator and assistant manager, and in 1891 became manager, which position he still holds.

The Cable.

Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company, New York, accompanied by Mrs. Ward, sailed for Europe on May 27 on the Steamer *Cedric*.

Mr. Robert Morrell, superintendent West India and Panama Telegraph Company, has returned to St. Thomas, B. W. I., after a tour of inspection covering all the company's stations in the West Indies and South America. While in Demerara Mr. Morrell contracted malarial fever and left for Europe on June 13 to recuperate.

Taxing Commercial Cable Company in Newfoundland.—The Supreme Court of Newfoundland has given judgment in favor of the Newfoundland government in its action against the Commercial Cable Company for $16,000 yearly as landing taxes. An appeal will be taken to the privy council.

An Extensive Cable Station at Far Rockaway.

A plot 100x200 feet, situated on Grandview Avenue, near Rue de St. Felix, at Far Rockaway, L. I., N. Y., has been 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. It is expected that a large number of the company's employes will be located at Far Rockaway.

Owing to the improvements and dredging being done at Norton's Point, Coney Island, the company has had to change its landing for ocean cables from that point and has located in Far Rockaway, which is about twenty miles distant from New York and situated directly on the Atlantic Coast.

The German-South American Cable Subsidy.—It is stated that the subsidy payable by the German Government to the German-South American Telegraph Company for the right of use of the company's cable to Brazil amounts to $322,000 per annum for the section between Borkum and Teneriffe, $220,500 for that between Teneriffe and Monrovia, and $210,000 for that between Monrovia and Pernambuco, the subsidy being for a period of forty years from the opening of each section. On the other hand, the company is entitled to 25 per cent. of the cable receipts, whilst the remaining 75 per cent. goes to the government, although only up to the amount of the total annual subsidies. The Imperial subsidy is calculated so that a surplus permitting of the payment of at least a minimum dividend of 6 per cent. remains after defraying all working and management expenses, interest and redemption charges on the bonds, and making allocations to the renewal and reserve funds.

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The Telephone.

Mr. M. Ruberg, of the American Telephone & Telegraph Company of Philadelphia, was a recent New York visitor.

Telephone Literature in Foreign Languages.—The New York Telephone Company is canvassing for business in the Italian, Hungarian and Yiddish quarters in New York by postal cards printed in these three languages.

Change of Title.—The title of Mr. P. K. Baker, superintendent of traffic on the Southwestern Telegraph and Telephone Company, Dallas, Tex., has been changed to general commercial superintendent.

Telephony in Korea.—The government authorities in Korea are considering a scheme for the establishment of a long-distance telephone line between Seoul and Fasan, in addition to the existing telephone services between Seoul and Makan.

Telephone Conference.—Superintendents of the Cumberland Telephone and Telegraph Company from various cities met at Memphis, Tenn., May 23, and discussed matters pertaining to the business of the company. Louisville, New Orleans, Nashville, Knoxville and Evansville were represented at the meeting.

Farmer's Telephones in England.—Among the reforms which the postmaster-general of England proposes to introduce into the postal and telegraphic services this year is the extension of the telephone to farmers on the party-line system, at the rate of $15 per annum for unlimited calls within a restricted area, with a small charge for calls beyond that area. There will be five stations on each line.

Southern Telephone Traffic Chiefs in Conference.—The traffic department of the Southern Bell Telephone and Telegraph Company met in conference in Atlanta, Ga., May 23, and discussed problems affecting the service in that territory. The conference was largely attended by traffic superintendents, chiefs, etc., from seven southern states. The address of welcome was delivered by Mr. F. E. Montague, general traffic manager.

Telephone Rates in Europe.—The rate for unlimited telephone service is $49 in Antwerp and Brussels, $78 in Paris, $58 in Lyons, $20 to $44 in Germany, according to size of exchange; $39 to $58 in Italy, $25 to $28 in St. Petersburg, $37 to $41 in Moscow, $83 in London, and $23 to $81 in Austria, according to statistics recently collected by the British government on European telephone lines. Measured service is also supplied in many places.

Telephony in Cuba.—There are now over 6,000 telephones in use in Cuba and the business is rapidly increasing. The Cuban Telephone Company, which is financed with English and American capital, is now installing long distance lines on the island. Mr. W. H. Talbott is president of the company, which uses an automatic system. The company gives unlimited service, the rate depending upon the class of telephone required. An office telephone costs $84 per year and a residence instrument $60. The company is now installing 1,200 miles of pole line throughout the island, which, it is expected, will be completed in about two years. The poles are of various hard woods found in the island.

Cutting Down Toll-Call Delays.—The New England Telephone and Telegraph Company has introduced a new method of handling short-haul toll calls. Toll calls to points within fifteen miles of any exchange are now being handled by what is known as the "two-number no-delay method." This obviates the necessity of referring the call to the toll operator and the somewhat slow process of having her ask a lot of questions. Instead of calling for some particular person therefore, and being subjected to cross-examination by the toll recording operator, the caller must ask his local operator for the number he desires and then hold the receiver to his ear until the person at the other end responds. Wherever this new plan has been tried it has given great satisfaction, as connections are made in less than one-tenth the time of the old toll routine.

Telephone Decision by Interstate Commerce Commission.—The Interstate Commerce Commission at Washington on May 13 decided the first telephone case brought to it since Congress placed telephone companies as common carriers under the commission's jurisdiction. Mr. Wm. D. Shoemaker, of Drummond, Md., brought suit against the Chesapeake and Potomac Telephone Company because the charge demanded for his residence telephone was materially higher than paid for the same service by his neighbors who were old subscribers and had contracted with the company when it operated the now abandoned exchange at Drummond. The complainant maintained that the rate was unlawful and discriminatory, but the court held that contracts between old subscribers and the defendant, even though valid when made, cannot be accepted as now justifying different charges as between different subscribers similarly situated, such undue discrimination being forbidden by the act.

Reduction of Telephone Rates Ordered.

The New York Public Service Commission, second district, has ordered the New York Telephone Company to make the following reductions in telephone charges in New York City:

1. From the Borough of Manhattan below 110th Street to the Borough of Brooklyn, except Coney Island and Bath Beach, and from Manhattan below 110th Street to central station districts Astoria and Newtown on Long Island, from 10 cents to 5 cents.

2. From Manhattan below 110th Street to central station districts Flushing, Richmond Hill, and Jamaica on Long Island, from 15 cents to 10 cents.

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Obituary.

Mr. E. C. Denham, age 45 years, assistant traffic chief of the Western Union Telegraph Company at Omaha, Neb., died on May 17.

Thomas Langdon, aged 68 years, a well-known old-time and military telegrapher, died at Minneapolis, Minn., May 14.

Col. Joe Hansen, an old-time and military telegrapher, and for many years president and superintendent of the St. Joseph Union Depot Company at St. Joseph, Mo., died at Hot Springs, Ark., May 24. Col. Hansen was a prominent citizen of St. Joseph.

Robert L. Sneed, aged 52 years, a well-known operator at Richmond, Va., died at Gordonsville, Va., on June 4. Deceased was one of the best known and most popular operators in the state and was admired and loved for his genial disposition and happy nature. At the time of his death he had been for several years the Associated Press operator for the Richmond *News-Leader*.

Thad. M. Schnell, aged 76 years, a well-known old time and military telegrapher, died at Des Moines, Iowa, May 30. He was born at Clearfield, Pa., in 1835, and learned telegraphy in 1851. With three brothers he entered the military telegraph service at the breaking out of the civil war and was stationed with the Army of the Potomac at various points. Mr. Schnell was employed in the Postal office at Des Moines for many years and recently wrote us that he was going to the hospital, but expected to be out in a few days. Three of the four brothers who were in the military service have died within the past few months.

Death of A. H. Inglee.

Albert H. Inglee, an old-time telegrapher, who was well known to many of the craft in all parts of the country, died in Ocala, Fla., on May 27. He was a native of Pembroke, Ont., and his first telegraphic service was in Montreal. Coming to the United States in 1878, his earliest engagement was with the Western Union Telegraph Company at Rochester, N. Y. Subsequent appointments found him located in New York, Washington, Cincinnati and Providence, from which latter place he returned to New York in the spring of 1890. Beside the Western Union, he had served the French Cable Company, the New York Associated Press, the United Press, the New England Press and the Associated Press. The state of his health led to the resignation of his position in New York early in 1910, and in March of that year he went to Florida in an endeavor to regain his strength. Finding that farming, in which he at first planned to engage, made too serious drafts upon his strength, he took a position as operator for the Western Union at Ocala. His death, which was sudden, was due to heart failure and nervous exhaustion

Memorial Services to General Fowler.—The annual memorial services in honor of the Fourteenth Regiment of Brooklyn, N. Y., well known during the Civil War as the "Fighting Fourteenth," and of General E. B. Fowler, were held at General Fowler's statue in Fort Greene Park, Brooklyn, Sunday, June 4. There was a large attendance. General Fowler was the father-in-law of Mr. W. H. Baker, vice-president of the American District Telegraph Company of New Jersey, New York, and was auditor of the Commercial Cable Company at the time of his death.

The Turner Monument Fund.

It is expected that ways and means will be devised by the Association of Railway Telegraph Superintendents at its Boston convention, June 26-30, to carry the Turner Monument project to completion. More than one-half of the necessary amount to defray the cost of the monument has been subscribed and the balance will no doubt be forthcoming.

In the work of keeping up the interest in the project and for the success which has attended the efforts so far, Mr. E. P. Griffith, chairman of the fund, deserves much credit. He has spent considerable time and thought on the matter, and has worked hard to make a success of the undertaking. He will have an interesting report to make to the Association at the Boston Convention on the work of the fund committee. This committee consists of E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, Telegraph and Telephone Age, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of Telegraph and Telephone Age, and the funds deposited with the Washington Trust Company, New York, as soon as received.

Contributions received up to date are as follows: Previously acknowledged, $1,594.25; John W. Platten, New York, $10.00; C. F. Massey Company, Chicago, Ill., $2.00; Geo. M. Hughes, Monroe, N. Y., $1.00. Total, $1,607,25. Mr. Andrew Carnegie has promised a liberal contribution to the fund to be handed to the treasurer when the actual work of construction begins.

Municipal Electricians' Convention.

Mr. C. R. George, Houston, Tex., secretary of the International Association of Municipal Electricians, is busy with the arrangements for the convention of the association which will be held in St. Paul, Minn., September 12-15. He is securing some excellent papers to be read before the association, and there is every promise that the convention will be a most profitable and interesting one.

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The Boston-Washington Underground Telephone Cable.*

BY B. GHERARDI, ENGINEER OF PLANT, AMERICAN TELEPHONE AND TELEGRAPH COMPANY, NEW YORK.

The project of having a complete underground conduit connection from Boston to Washington, and having therein a cable which would insure the service between these points against failure from storm damage, is one of President Vail's great ideas which is about to become a reality.

It is proposed to place in the conduit an underground cable, some of the circuits of which will be so efficient from a transmission standpoint that it will be possible to give telephone service between Washington and Boston over these underground conductors. This will be by all odds the longest telephone cable in the world.

This cable itself, and the conduits to provide for it, will represent a very large expenditure of money, and it is an indication of the broad policy which Mr. Vail is applying to the direction of the telephone business of this country that he is prepared to take such steps to insure the telephone service between Boston, New York, Philadelphia, Baltimore, Washington and the other points on the route of this cable against failure from storm damage.

The interesting feature of this cable, from an engineering standpoint, is that it is so constructed that practically all of the circuits in it may be phantomed and so that these phantom circuits as well as the side circuits, of which they are made up, can be loaded.

The loading problem on these cable circuits does not differ substantially from the problem of loading aerial phantom circuits which has already been described (see June 1 issue.) The difficult work in connection with the design and construction of the cable was to have the circuits sufficiently well balanced so that they could be loaded and phantomed without bringing in objectionable crosstalk.

The make-up of this cable is shown in the accompanying illustration. In the middle of the cable there are fourteen pairs of No. 10 B. & S. gauge conductors. Outside of these there are thirty-six pairs of No. 13 gauge conductors. In the spaces between the No. 13 gauge conductors and the No. 10 gauge conductors, six pairs of No. 13 gauge conductors have been put in because there was space for them. At the outside of the cable eighteen pairs of No. 16 gauge conductors have been placed because there was room for them. All of the No. 10 gauge pairs and the No. 13 gauge pairs, except the six put in between the tens are arranged so that they can be phantomed. That is to say, they are arranged in what we call a "quad formation." Each of these quads is built up by taking two twisted pairs and twisting them together, giving due attention to the length of twist employed on the pairs, and in twisting the pairs together. By this construction an arrangement is obtained which can be phantomed, providing certain necessary balances of capacity exist.

In connection with splicing up this cable, care must be exercised, not only to see that the wires are correctly jointed together, but at certain points tests are made to determine the capacity unbalance of the circuits in two directions, and at these splices to so associate the wires and pairs as to have these unbalances in opposite directions, that is, so that they will tend to neutralize each other.

These precautions are necessary because the transmission efficiency of the cable is so great that crosstalk taking place at a considerable distance from either of the stations at the ends of the cable would be much more audible than in circuits of lower transmission efficiency.

The loading coils are spaced at intervals of about 1.4 miles, the side circuit coils and phantom coils being placed at the same point. This spacing is determined by the capacity of the conductors, the side circuits having a mutual capacity of about .070 mf. per mile and the phantom having a mutual capacity of about .1 mf. per mile.

The transmission efficiency of these circuits is interesting, and in this connection I may say that

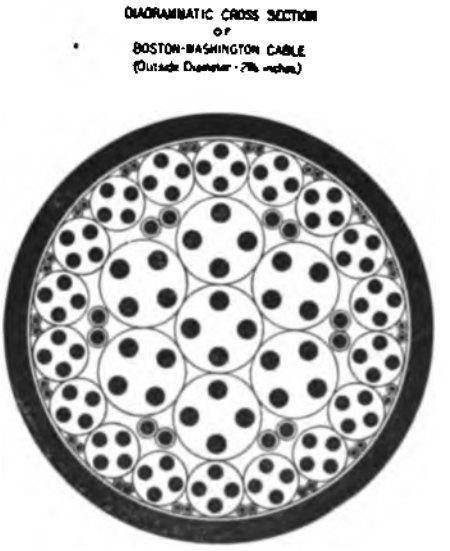

DIAGRAM SHOWING ARRANGEMENT OF CONDUCTORS IN BOSTON-WASHINGTON UNDERGROUND CABLE.

while a sufficient amount of this cable has not as yet been manufactured to permit of actual transmission tests on it, so great is our confidence in formulæ for computing these efficiencies which have been developed as a result of our studies and experiments that we are satisfied that the results predicted will be obtained, and the manufacture of about 150 miles of this cable at a cost, including loading of about $1,000,000, has been recommended with complete confidence in regard to the results.

The distance from New York to Washington is 235 miles. The most efficient circuits in this cable will be the No. 10 phantoms. These will have a transmission efficiency equivalent to only thirteen miles of standard cable. That is, they are nearly

* Extracts from paper read before the New York Telephone Society, April 18.

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twenty times as good as standard cable and decidedly better than unloaded aerial No. 12's. The physical No. 10 circuits will have a transmission efficiency between New York and Washington of sixteen miles of standard cable. The phantomed thirteens twenty-one and a half miles of standard cable and the physical thirteens twenty-eight and a half miles of standard cable. These last circuits would not give good service from all subscribers in Manhattan to all subscribers in Washington. They will, however, be very useful from New York to Philadelphia, Wilmington and even Baltimore, and for other combinations such as Philadelphia and Washington. Between Boston and Washington the only circuits that can be counted on for commercial service will be the phantomed No. 10's. These will give a transmission efficiency between test boards of twenty-six miles. This will be sufficient to insure the service in case the open wire lines are down, although it is not expected that they will have to be used in this way, because it is not likely that there will be so many breaks in the lines that the cable would have to be used at any time all the way from Boston to Washington. All open wire lines are not likely to be down at the same time both north and south of New York City. The cable intersects the open wire lines at numerous points between these two places so that patches can be made at short intervals.

QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. Having completely covered Mr. Jones' book we are now covering "The Quadruplex," by Maver and Davis, and will bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER III.

What is the function of the transmitter used in the Stearns duplex?

How many wires are wound around the magnet cores of the relays used in duplexes and quadruplexes?

How are they wound, and why are they so wound?

If the two wires around a relay core are of equal length and resistance, what is the magnetic effect upon the relay when an electric current is applied at the home station?

What is the effect upon the relay when a battery is applied at the distant end?

What is the object of the multiplex systems of telegraphy?

How is one wire used to do the work of two by means of a duplex and of four with a quadruplex?

What is the rheostat used for?

Can a rheostat be adjusted to balance the resistance of a wire?

Is it necessary that a wire should have a given resistance in order to work it duplex or quadruplex?

Why does one wire of larger diameter than another carry more current?

What is the effect upon the current of using wires of larger resistance?

In order to balance the resistance of a line-wire by the use of a rheostat must the size and length of the wire in the rheostat be the same as that of the line-wire?

What kind of wire is used in the construction of the rheostat?

Why is fine german silver wire employed for rheostat coils?

Study the method, from Fig. 15, of connecting the german silver coils of the rheostat with the brass discs on the top of the box.

How are the german silver coils wound?

Why are they so wound?

State the law bearing upon this point of construction?

If we have a wire of say 3,000 ohms resistance, how can we balance it on the rheostat?

What is the effect of wet weather upon the line resistance?

How is the resistance in the rheostat altered to meet such changes in the line resistance?

Why is it necessary to preserve a balance between the line wire and the rheostat?

How is the resistance of the rheostat coils indicated?

In the construction of condensers what electrical law is involved?

If we electrify a conductor with electricity of one polarity, what is the effect upon surrounding objects?

What is the name of such action?

Are all substances equally susceptible to inductive influence?

Can inductive effect be prevented by screening?

What medium possesses the lowest inductive capacity?

What substance has the highest inductive capacity?

How is the practical condenser constructed?

How are the sheets of tinfoil connected and how are they separated from one another?

Referring to Fig. 17, what is the effect of charging one set of the plates by contact with the line wire?

How is the capacity of a condenser varied? Study the construction of a condenser, as illustrated in Fig. 18.

Telegraphy in Siberia.—A bill has been submitted to the Russian Duma providing for improved telegraphic communication between western Siberia and western Europe and contemplating the erection of four wireless telegraph stations on the shores of the Kara and White Seas.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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June 16, 1911.

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

Railway Telephone and Telegraph.

It is never safe to assume that what cannot be done today cannot be done tomorrow; our knowledge of today is not so ripe as that of tomorrow. This truism was never more exemplified than in the adoption of the telephone to train dispatching. It is only a very few years ago that railway officials looked upon the proposal to substitute the telephone for the telegraph in railway operation as a risky, if not dangerous experiment. Their fears were not grounded upon facts, however. The practicability of such use of the telephone had not at that time been demonstrated and they argued from their experience with it at that day which was very limited indeed. The fact is few people knew how to use the telephone even in those days and had no idea of its possibilities. It was known that the instrument would not carry certain sounds and that other sounds were so much alike that the telephone could not be relied upon as a means for directing the movements of trains. Since then, however, experience has taught us to use it properly and get the best results out of it. The fault was not with the instrument, but was due to the lack of knowledge on the part of the users of it.

Now things are all changed. The possibilities of the telephone are better understood and experimentation and experience have proved its flexibility and adaptability to many uses. The result of these investigations is shown in the wide and extending employment of the telephone in train dispatching, and it is not rash to predict that it will eventually supersede the telegraph entirely in this class of work.

The railway telegraph service has generally been placed at a disadvantage in its relation to railway management. All railway officials admit that it is an actual necessity in modern railway operation, yet they have as a rule regarded it as an unproductive service in a money sense. It was never intended to make money directly for the companies, but it does indirectly make money for them by helping to save it and by the conveniences it affords the managers in the transaction of business. The time element comes in here. The telegraph, first of all, saves time, and time, above all else, is equivalent to money to a railroad. Every use of the telegraph for legitimate railroad business means, in one way or another, an increase in the company's revenues. It may not be apparent to the ordinary observer, but an analysis of each transaction of this character will generally lead to this conclusion.

We have spoken here of the telegraph particularly because it was toward the telegraph that the attitude referred to was assumed. The telephone coming as it did, many years later, has generally been looked upon with more favor. But whatever feeling in regard to the telegraph ever existed has all disappeared, and every railroad manager now regards it as essential to the transaction of railway business as any other part of the company's operating equipment.

Is the Change of Title of Railway Telegraph Superintendent Imminent?

Is the superintendent of a railway telegraph system an official reality if there is no telegraph to superintend? The telephone has entirely superseded the telegraph on some roads, and will do so on many others; therefore, the title of superintendent of telegraph certainly is and will be a misnomer. To describe the duties of these officials their titles will have to be revised and brought up to date. "Superintendent of telephone," or an equivalent seems to be the only logical solution of the problem.

General Electric-Westinghouse Pool Dissolved.—It is stated that the General Electric Company and the Westinghouse Electric and Manufacturing Company have canceled their fifteen-year patent pool agreement.

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Governor Wilson on Corporations.

In a recent address on "Corporations," before the University of California, Governor Wilson of New Jersey said in part: "We are no longer afraid of our corporations as we used to be, because we are beginning to understand just what they are, and, to some extent, at any rate, just how they can be controlled and made to serve the purposes of our life without governing and controlling us. There was a time when our feeling about them was almost one of panic. We had undoubtedly ourselves created them. There was no disputing the fact that they were our creatures, made by laws which we ourselves had enacted, and had supposed we understood; but we stood amazed at the work of our own hands, and not only amazed, but awed and frightened. It is not a little amusing, as we look back upon our one-time state of mind in this matter, because, having created the corporations, we can certainly alter them if we please, and control them in any way that we choose. They are not actual persons. We made them—God did not—and we can alter the work of our own hands as we will."

In referring to public service corporations, Governor Wilson said: "Public service corporations, such as railroads, street railways, gas companies and companies which supply electric light and power, are in a still larger sense public instrumentalities. Besides having the artificial advantages and powers conferred upon the ordinary corporation doing what we call private business they are in partnership with the government in the laying of rails, the erection of poles and wires and the laying of conduits as the means of transmitting their service. They have had delegated to them the government's right of eminent domain, the right to make partial use of public highways, to condemn rights of way across pieces of private property.

"Moreover, they are in a very interesting sense natural monopolies. They generally use the pieces of land and the roads and highways which are most convenient to their purposes, and most direct for effecting the communication which they wish to effect; and it is perfectly obvious that if other companies are allowed to compete with them, there is a very wasteful duplication in outlay and equipment. So that competition generally results in an eventual combination of the competing companies and the necessity to charge a price on what they supply that will pay the interest on twice as great an investment as was really necessary for the service."

"The real difficulty in the management of our corporations in recent years," he said, "has been the wrong point of view of those who were in control of them. They did not recognize that they were public trustees. They acted as if they were conducting their own private business. Let them change their point of view, and there is no problem to solve. There is no legislation necessary if they will only regard themselves as trustees of the common interest, bound by considerations not private, but public, in the conduct of their business.

"I think that the spirit of the age is slowly changing," Governor Wilson said in conclusion. "The time of contest and vituperation and mutual abuse and misunderstanding is passing away. It is beginning to be recognized that those who are leading the reform movement of the age are leading it in all sincerity and genuine public spirit."

Highway Crossing Bell Signals in Canada.

Following are the specifications for electric bell signals at highway railway crossings as issued by the Board of Railway Commissioners of Canada:

POST.—The bell must be placed upon a post of some suitable structural material. If the post is made of wood, it must be of sound timber not less than 8 by 8 ins. and 18 ft. long, and shall be firmly set in the ground to a depth of 4 ft. If it is made of iron or steel, it shall be not less than 4 ins. in diameter, shall extend 14 ft. above the ground, and shall be firmly bolted to a concrete or other foundation constructed below the frost line. If other suitable structural material is used it must be of the length mentioned above, and of sufficient strength to carry the weight placed upon it.

BELL.—The bell shall be either of the locomotive type, the gong type, or the twin-gong type, and it must in each case emit a clear, loud volume of sound under all weather conditions. If the locomotive type is used the bell shall be of standard size (about 18 ins. in diameter); if the gong type is used, the gong shall be at least 12 ins. in diameter; and, if the twin-gong type is used, the gongs shall be at least 10 ins. in diameter.

SIGN.—A sign shall be placed upon the same post as the bell, with the word "danger" upon it in letters of not less than 6 ins. in length, to be illuminated either by direct or reflected light so as to be plainly visible after sunset. There may be added to the post, if so desired, the railway crossing sign provided for by sec. 243 of the Railway Act.

OPERATION.—The bell and the illumination of the sign shall be controlled and operated electrically and automatically by the approach of trains, in such manner that only approaching trains shall operate the signal, and the signal must remain in operation until the rear end of each approaching train has passed the crossing. The bell and lamps used for illumination may be operated from any suitable source of electric current that is continually available, or from batteries. If batteries are used they must be either chemical batteries of the caustic potash type, having a capacity of not less than 300 to 400 ampere hours, or storage batteries of the same capacity.

Mr. Carnegie Promoter of Peace.—The *Christian Advocate* of May 25 publishes an editorial on Mr. Andrew Carnegie in connection with the unveiling of the bronze tablet on April 28 at Pittsburg in memory of the forty-three volunteers from Alleghany County, Pa., who served in the United States Military Telegraph Corps during the Civil War. It refers to Mr. Carnegie as a philanthropist and an enthusiastic promoter of peace.

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The Boston Meeting of the Association of Railway Telegraph Superintendents.

The act of one man fifty years ago set in operation forces which find expression in the Association of Railway Telegraph Superintendents. When Charles Minot, superintendent of the Erie Railroad, in the fall of 1851 sent the first telegraph train order, he nor any of his contemporaries realized the importance of this bold step nor had they the faintest idea as to what it would develop. Mr. Minot himself was confident of the result of his experiment, but his associates looked upon it with many misgivings. The greater mind, however, dominated and Mr. Minot carried the day and opened the way for the development of what is now one of the most important departments of railway operation—the control of the movements of trains by telegraph or telephone.

I. T. DYER,
Of Los Angeles, President.

J. B. SHELDON,
Of Omaha; First Vice-president.

To trace the development of train dispatching by telegraph since the first telegraph train order was sent, would be a difficult task; it is sufficient for our purpose to look at the results. Railroad managers are ready to adopt anything that will yield results. The telephone has taken its place in railway operation, and it has proved to be such an advance that it is rapidly displacing the telegraph. This brings up the question of the official title of the men who manage the telegraph-telephone department of the railroads. There is at least one large railroad that has substituted the telephone for the telegraph over its entire system. Is the head of the department superintendent of telegraph or superintendent of telephone? The members of the association will probably be confronted sooner or later with this question and although it need not be a difficult one to settle, it might be given thought in the meantime.

P. W. DREW,
Of Chicago; Secretary-Treasurer.

C. SELDEN,
Of Baltimore; Chairman Eastern Division.

The operation of railways by telegraph or telephone has called for the use of many modern electrical inventions, such as electric generators, electric motors, storage batteries, etc., but these after

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all are mere machines. The real achievements originate in the human brain. Without the application of thought the machines could not act, indeed they would not exist. So after all, it is not the machine that deserves our admiration, but the brains that conceived it.

The Association of Railway Telegraph Superintendents has grown to be one of the most important

E. A. CHENERY,
Of St. Louis; Chairman Western Division.

arms of the railway service, and will become more so as time goes on, since by the use of the telegraph or telephone the consumption of time is reduced almost to the vanishing point.

The Association's annual meetings are very profitable to the members and the railroads they represent, for they afford the opportunity for each

W. C. WALSTRUM,
of Roanoke, Va.; Chairman Topics Committee.

one to learn what the others are doing in the line of progress. To be widely informed the railway telegraph superintendent must necessarily move about in his own bailiwick and observe things, and do the same, as far as possible, with reference to other lines. But to keep in touch with the work of others undoubtedly would require too much time and labor, hence the necessity of an organization which will bring all superintendents together at a prearranged time and place for the exchange of ideas and experiences for mutual good. It is therefore the duty of every member to add to

G. A. CELLAR,
Of Pittsburg; Chairman Committee on High-Tension Wire Crossings.

the fund of general knowledge as far as he can, and thus get the best out of these periodical gatherings.

The Association of Railway Telegraph Superintendents is accomplishing excellent work and aiding very materially in the upbuilding of the rail-

W. F. WILLIAMS,
Of Portsmouth, Va.; Chairman Committee on Miscellaneous Matters.

road service of this country. The association has made its impression on the railway world and has acquired a standing among professional bodies that the members may be proud of.

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The Hotel Brunswick, which will be the headquarters of the Association of Railway Telegraph Superintendents during the Boston convention, is one of the most popular hotels in that city. It is located on Boylston Street and is within two blocks

HOTEL BRUNSWICK,
Boston, Mass., Convention Headquarters.

of the New York, New Haven and Hartford and the Boston and Albany Railroad stations. It is directly opposite the Massachusetts Institute of Technology and Copley Square, and is convenient to the principal points of interest in the city. No less than fifteen different electric car lines pass the

E. P. GRIFFITH,
Of New York; Chairman Committee on Form for Delivery of Messages on Trains, etc., and Chairman of the Turner Monument Committee.

door of the hotel, enabling the guests to reach any part of the city and suburbs. The Brunswick is conducted on the American and European plans, and is modern in all respects.

HISTORY OF THE ASSOCIATION.

It may be of interest to many to trace in brief the history of this organization from its inception at Chicago, November 20, 1882. At this first meeting the officers elected were: W. K. Morley, president; William Kline, vice-president, and C. S. Jones, secretary and treasurer.

W. W. RYDER,
Of Chicago; Chairman Committee on Resolutions.

At the second meeting also held in Chicago, June 13 and 14, 1883, the interest in the new organization was shown by the fact that there were thirty railroads represented. Mr. Morley was again 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 East claimed the sixth convention, which 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 elevated to the presidency, and G. C. Kinsman was elected vice-president.

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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 superintenderts 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 lengthy 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.

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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

S. A. D. FORRISTALL,
Of Boston; Chairman Entertainment Committee.

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.

Growth of Telephone Train Dispatching.

In every issue for some time past we have recorded the introduction or extension of the telephone train dispatching system on one or more railroads in this country and in Canada, attesting to the superiority of the telephone over the telegraph for this class of service. The experimental stage in this application of the telephone has long since passed and the practice has become standardized.

We publish in this issue a table showing the status of the telephone in railway train dispatching operation in the United States and Canada, and the most interesting thing about it is the great increase shown over last year's statistics of the number of miles of road controlled by the telephone dispatching system. Some railroads did not report but these are few compared with the total number, so the results are reasonably accurate. The statistics show that at the time the table was compiled, June 1, there were 40,160 miles of track controlled by railway telephone dispatching, while in the year previous the number of miles was 24,831, showing an increase in one year of 15,329 miles, or slightly over 60 per cent.

The record is indeed a remarkable one and shows the keen interest taken by railroad managers in new things of merit. It is reasonable to assume that every mile of the railroads in this country now using the telegraph will eventually be equipped with the telephone system in a very few years, now that its advantages have been demonstrated beyond question.

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.]

45. Q. Can you inform me what is the standard wave length adopted by the United States Navy for ship wireless telegraph installation? W. T. I.

A. Four hundred and twenty-five meters.

46. Q. Will you please explain the process of charging storage batteries and how to take care of them in order to get the best service out of them? F.

A. The information desired would require more space than we can give up to it in this column. We refer our correspondent to any standard work on storage batteries for complete information. "Storage Batteries, Their Theory, Construction and Use," by A. E. Watson, is an excellent book on the subject. It is written in very clear and simple language and covers the subject very thoroughly. This book can be obtained of Telegraph and Telephone Age at $1.50 per copy.

Telephone Train Dispatching on Pittsburg and Lake Erie Railroad.—The Pittsburg and Lake Erie Railroad will equip two circuits with fifteen telephone selectors and the necessary telephones and auxiliary apparatus. One circuit, equipped for eight stations, will be put in between McKeesport and Brownsville, Pa., a distance of forty miles. The other, equipped for seven stations, will be installed between McKeesport and Connellsville, Pa., a distance of forty-three miles, Western Electric apparatus being used. The dispatcher for both circuits will be located at McKeesport. Mr. L. A. Lee, Pittsburg, Pa., is superintendent of telegraph.

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Artistic Office Front at Seattle.

The accompanying illustration shows an exterior view of the Western Union main office at Seattle, Wash., and was made from a photograph taken at midnight recently. The feature is the magnificent marquee awning, which, when lighted at night, gives a very handsome and artistic effect. The rays reflecting upon the plate glass window, make the surroundings as bright as by day. The marquee is nine feet wide by sixteen feet long, by twenty inches deep and is constructed of heavy angle steel and galvanized sheet iron.

The roof is heavy fireproof glass laid on steel beams. The background of the sign is of double-strength, dark blue flash-glass sand blasted on one side and inlaid with ten-inch letters of white opalescent glass and is illuminated with fifty twenty-five-watt tungsten lamps on the inside. The white letters and blue background make a very brilliant and contrasty day sign of the Western Union standard sign colors.

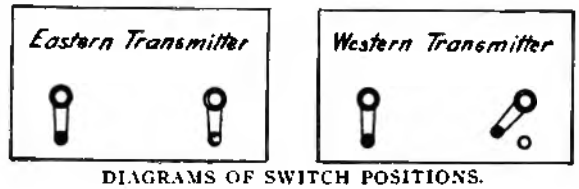
At night the rich glow from the marquee lights gives the exterior and front office a cheerful and inviting appearance. Experts in marquee construction state that this is the most effective and artistically illuminated marquee in the Northwest.

ARTISTIC FRONT OF WESTERN UNION TELEGRAPH OFFICE, SEATTLE, WASH.

Testing Repeater Points.

BY J. B. DILLON, DALLAS, TEX.

On page 319 of the May 1 issue of TELEGRAPH AND TELEPHONE AGE, Mr. J. B. Slocum, night chief operator of the Postal Telegraph-Cable Company at Buffalo, N. Y., shows an arrangement to test the main line points of a Weiny-Phillips repeater. The accompanying diagram shows how the same test may be applied to the Atkinson and Milliken repeaters. The illustration shows the connections when the Western side is being operated. If the Eastern side is the one in operation then of course the positions of the switches must be reversed.



DIAGRAMS OF SWITCH POSITIONS.

In this connection it might not be amiss to state that while this quick test shows whether the main line points are breaking, it does not indicate how the signals are passing. To ascertain this fact we must cut in at the main switch-

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board, for the reason that in wet weather it is necessary to increase the spring tension on repeater relays. In consequence of this the tests would not permit of the opposite relay responding in tone to the opposite points because of this high adjustment. The main switchboard relay can be adjusted to meet the conditions without disarranging the repeater relay adjustment.

Hence I would not recommend the test in any but dry weather when both relays are working on a normal adjustment.

Railroad Telephony.

Mr. Gregory Brown read a paper on "Some Recent Developments in Railroad Telephony" at the Pacific Coast meeting in Los Angeles, Cal., of the American Institute of Electrical Engineers.

Mr. Brown reviewed the progress of train dispatching by telegraph which has been in vogue about sixty years, and has on the whole given quite excellent results. A few years ago the passage of the nine-hour telegraphers' law made it imperative for the railroads to reconsider the matter of dispatching in all its branches. It was at this time that the first extensive attempts to use the telephone for this service were made and less than four years ago the first telephone dispatching line using modern equipment was installed in New York. The telegraph has performed three main classes of service for the railroads. First, train dispatching; second, message service; third, block-wire service. While the first of these is most important, the attempt to use the telephone for railroad purposes involves the need of its meeting the other classes of service also.

In the dispatching work three requirements are apparent. One, ability to signal any one of fifty or more stations on a 250-mile line and ability to signal the dispatcher from any one of these stations; two, arrangements whereby any number of stations can simultaneously listen in; third, means for quickly testing and patching any portion of the circuit which gets into trouble. These requirements the telephone has met completely. Moreover, its great flexibility has made it possible so that officials who are not telegraph operators, but who are interested in the movement of railroad traffic, can listen on the wire and keep in touch with traffic conditions; it has also permitted the signaling of stations without interrupting conversation; it also gives automatic notification to the dispatcher that the station which he is calling is actually receiving the signal.

Mr. Brown described at some length the three types of selectors which are used for calling any particular station. These are: instruments responding only to a number and duration of long and short current impulses, or long and short intervals between impulses; instruments arranged to be installed simultaneously and to operate independently but in synchronism with each other by means of local energy at the station; instruments of the step-by-step type which are stepped around in synchronism by a succession of impulses from the dispatcher's office, the number of these impulses determining the station called. The Gill selector is an instrument of the first or code-impulse type. The Wray-Cummings selector is one of the second type and the new Western Electric selector is one of the third type.

The telephone has completely provided the message service that is necessary in railroad work. The message wires are also used for sending out time to the stations and towers, the method having been developed to do this with entire reliability. Block service has also been provided for communication between two adjacent block towers. Telephones are also used extensively at railroad sidings and enable train crews to get in touch immediately with the dispatcher. Portable telephones have come into use on trains, some railroads providing a portable set for each train with a line pole so that connection can be made with the line in case of accident or delay.

How Mr. Sprague Left Mr. Edison's Employment.

Mr. Frank J. Sprague, the well-known electrical engineer and inventor, of New York, has been presented by the American Institute of Electrical Engineers with the Edison medal for meritorious achievement in electrical engineering. Mr. Thomas A. Edison was a special guest.

In accepting the medal Mr. Sprague reviewed his work in electrical engineering, and referred to his association with Mr. Edison, having left the navy to enter the employ of Mr. Edison as assistant. He recalled the surprise, when in 1883 he reported for duty to Mr. Edison, with which the news was received that Mr. E. H. Johnson had promised him the munificent salary of $2,500, the manner of Mr. Edison betokening a doubt as to his earning capacity.

After a period of activity in connection with the earlier central stations, a request that he should leave the construction department in order to undertake some calculations in relation to the transmission of power, which would have led to an interruption in lines of work in which his interest was increasing, caused him to enter a protest with Mr. Edison, to which the following reply was received: "Sprague: As the construction department is about to be given up, I think the better plan would be for you to resign. Edison." Mr. Sprague said that he did resign and that this is the real reason why he is the recipient of the Edison medal. "No man," he said, "who thinks that he has within himself the capacity for a reasonable share of independent development, and who wishes to carve out his own career, can ever remain the agent of any one, and surely not the subordinate of a man of such intense activities and of so dominating a personality as that of the great inventor who has left such an imprint upon his age and whom all delight to honor."

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Easy Tests for Trouble on Railway Telephone Lines.*

BY J. A. KICK,
SUPERINTENDENT OF INSTALLATION, NEW YORK CENTRAL LINES WEST OF BUFFALO, CHICAGO.

The all-important circuit in railway service is the dispatcher's circuit. It commands first attention in all maintenance work.

Telephone dispatching equipment is divided into two classes, "Transmission" and "Signaling," either or both of which may be partially or totally interrupted, depending upon the nature and location of troubles. Failures in one class of equipment may or may not cause partial or total failure in the other.

A ground on one side of a metallic signaling system will not interrupt the signaling, but may produce sufficient noise to drown the transmission. To locate such ground troubles, ring to call in the test stations, and by opening the line switch locate the trouble between two test stations. Then ring in the intermediate stations and have each momentarily open the cut-out switch (a switch which clears the line of all office equipment). If the opening of the switch does not clear the trouble, have the station put a "short" across the line for a listening test.

If the opening of any cut-out switch removes the trouble have the attendant clean the arrester, or remove the carbons, and then close the switch for test.

Should the ground be between stations the listening test will quickly show between what points to look.

Linemen with test sets can call in between stations and give the wire chief a "short" for a listening test, report clearing trouble, get clearances with further instructions, and in general get and give much assistance.

It is well to keep in mind the fact that a "short" near the trouble, even though the "short" be on the far side from the wire chief, will so nearly balance the line as to be deceptive. The longer the line between the wire chief and the point of test the more careful the wire chief must be to avoid being deceived by tests at points near the trouble.

To illustrate: A ground on one side of a telephone circuit causes noise, because induced current is afforded a path to ground direct from one wire of the pair, and indirectly from the other through the bridges. That is, an unbalanced static condition is produced.

If the equipment can be stripped from the line, and a "short" placed on the circuit at some point beyond the ground trouble, a bridge measurement will very effectively locate the trouble. But it is not always possible to accomplish this, and for practical purposes a location between two stations will be satisfactory.

An open wire will totally interrupt the selective signaling to stations beyond the open, and may so change the current values on the line between the main office and the open as to cause a failure of these selectors.

In cases where an "open" of one line wire does not interrupt the signaling between the main office and the "open," a general idea of the location can be quickly secured by ringing each station and observing the last station on the line that can receive a ring.

Each test station can be asked to open the line switch. When one between the main office and the trouble is opened it will cause the circuit to be balanced, and as a consequence quiet to the main office.

After locating the trouble between two test stations, a listening test can be made by having the intermediate stations put a momentary "short" across the circuit, the results being practically the same as in locating ground troubles.

Where the line is stripped of equipment, an approximate location of the "open" can be made by switching a grounded test set from one line wire to the other, and closely observing the volume of sound produced by the static discharge from the faulty line wire against that of the good wire. That is, their static capacity will be about in proportion to their lengths. This test is similar in effect to the test made on Morse circuits, with which all wire chiefs are familiar.

SPECIAL METHODS OF LOCATING CROSSES.

In locating crosses on a dispatcher's circuit, more care must be taken, as a low resistance cross may blow fuses, fuse relay points or do other damage where attempts are made to signal without first having secured some idea of the probable location and nature of the trouble. It is much safer to make a preliminary talking and listening test with one or two stations.

High resistance crosses will cut down transmission, and may partially interrupt the signals, although some such crosses are so high in resistance as to be only noticeable in the transmission.

A selective signaling circuit with a large number of stations may be noisy to one terminal and quiet to the other, or may be noisy to the middle stations and quiet to both terminals. This effect is chargeable, in part, to the numerous signal bridges across the line.

It is advisable to frequently inquire of some scattered stations to ascertain if any section has developed an unbalanced condition, causing any noise which is not discernible to the main office.

Considerable trouble is experienced from loose connections and high resistance joints in the main circuit. Much trouble has come also from the use of old telegraph wires in which were poor sleeve and hand joints.

In some unimportant circuits wires of two gauges are used, and in others one wire of iron and one of copper. Where this is compensated by cutting in the transpositions little trouble is experienced, but where wires that are not similar are maintained throughout an unbalanced and noisy circuit is the result.

In testing for slight noises on any circuit it must be kept in mind that the noise may become almost imperceptible by cutting off a greater part of the

* From *Telephony*.

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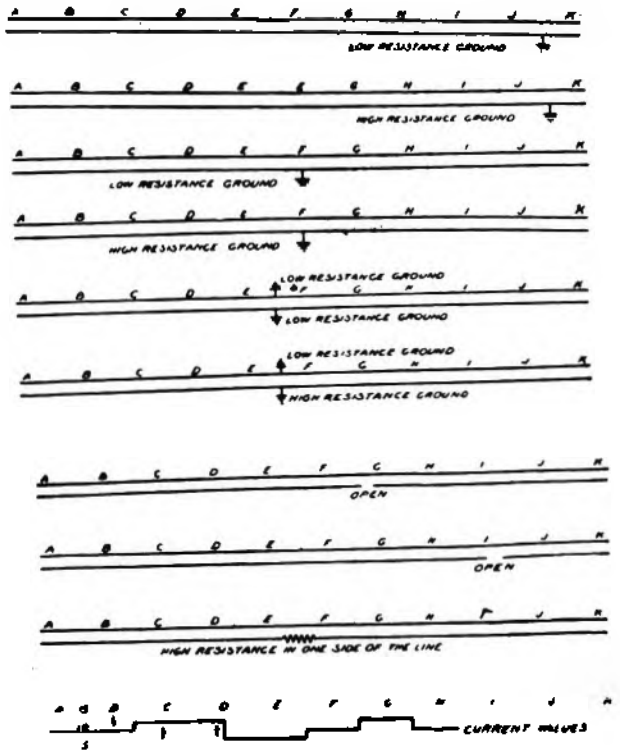
capacity. That is, a high resistance joint, loose connection or high resistance ground may produce a light noise, which will almost altogether disappear when the greater part of the line is taken off by "shorting" or opening the line.

As an instance, a line is reported noisy to the exchange operator, and on cutting off the line a listening test on both the line and drop will show clear. But when the drop is cut through to any long line a noisy circuit is the result.

The trouble is on the drop side, but as there is not sufficient static capacity in this circuit, no noise is perceptible until a line is attached.

In testing for any difficult line trouble it is very good practice, if convenient, to have some one at the distant terminal "listen in" and check the tests.

A lineman looking for a cross between two stations, being unable to get any help from the master station, resorted to a scheme of having the first station each way from the trouble "listen in" while he grounded one side of the circuit at some point between the stations.



FIGS. 1-10.—DIAGRAMS OF VARIOUS KINDS OF CIRCUIT TROUBLES, ETC.

On the first test the circuit was noisy to "A" and likewise on the second test, but decreased in volume, while on the third the circuit was quiet to "A" and slightly noisy to "B," indicating that the trouble was between the second and third testing points.

The following diagrams are to represent a metallic dispatching telephone circuit 100 miles in length and, as indicated, in an unbalanced condition.

For reference the stations are lettered and the line considered as ten miles between stations.

Conditions with respect to transmission and signaling for each circuit are indicated under (1) and (2) corresponding to the following conditions of the line:

(1) Line normal with all signal bridges regular.

(2) All equipment removed.

Fig. 1. (1) Very slight if any noise to A. Very noisy to K.

(2) Considerable noise to A. A roar at points near the trouble and especially at K.

No interruptions to signals.

Fig. 2. (1) Slight noise to stations near the trouble.

(2) Slightly noisy to all stations and likely serious to J and K.

No interruptions to signals.

Fig. 3. (1) Noisy to all stations and especially those nearest at each side of the trouble.

(2) A roar to all stations.

No interruptions to signals.

Fig. 4. (1) Slight noise at A and K, increasing toward trouble.

(2) Unless the ground is very high the circuit will be very noisy, increasing toward the trouble.

No interruptions to signals.

Fig. 5. (1) Quiet to all stations.

(2) Very slight, if any, noise.

Interruption to both signals and transmission (equivalent to a short-circuit).

Fig. 6. (1) Noisy to all stations, increasing toward the trouble.

(2) Very noisy to all stations.

Unless the ground is very high in resistance the transmission will be materially reduced and the signals to stations near and beyond the trouble interrupted.

Fig. 7. (1) Slight noise at A, increasing toward I. Very noisy near the trouble and at J and K.

(2) Very noisy to all stations.

Signals and transmission interrupted at the break.

Fig. 8. (1) and (2) Very noisy to all stations.

Signal interrupted at F, and if selectors have not a very wide range of current possibly all fail. Transmission practically total interruption.

Fig. 9. (1) Noise proportional to the amount of added resistance in the fault. 100 ohms-circuit quite noisy to the adjacent stations, but not excessive to A and K. 1,000 ohms-circuit very noisy to all points.

(2) 100 ohms or more likely total interruption.

With 100 ohms in the fault there would likely be no interruption to signals, but with 1,000 ohms there would likely be such a voltage drop between E and F as to so change the current values to stations beyond E that the signals would fail.

Selective signal system failures due to line troubles having been explained in the preceding diagrams, we will now consider equipment troubles.

A large percentage of the failures, which are not due to change of line conditions, are chargeable to battery troubles and not to the equipment.

A selective signaling system with a current range of from 5 to 15 milliamperes may be installed with sufficient battery to produce 10 milliamperes in all bridges, and with an individual adjustment ranging from the maximum to the minimum. That is, some

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selectors are adjusted up to 10 milliamperes, others down to 10 milliamperes, with a result that any added current freezes up those adjusted up to 10 milliamperes, while a reduction in current fails to pull up those adjusted down to 10 milliamperes.

Investigation of selector failures will develop the fact that not more than one case out of a hundred is due to actual defects in the mechanical parts or electrical features, except when chargeable to improper adjustment, changing current conditions, or both.

Current changing conditions are sometimes due to wire or equipment troubles, but more often to the battery itself.

A total failure on a clear line means main office trouble, and can be located by observing a series of signaling operations which will indicate whether the failure is due to the local circuit of the master selector or is in the main battery circuit, where local tests will easily develop its source.

The failure of one way station selector may mean faults developing in the individual selector or its combination at the main office, but in most cases it will be found to be a changed current condition on the line or in the local of the selector.

Share of Work Done by Terminal Batteries.

BY M. S. CLINE, LYNCHBURG, VA.

Referring to question No. 40 under the heading "Questions and Answers" in TELEGRAPH AND TELEPHONE AGE for May 1, it is not clear to me that the answer given is entirely correct; that is, where the resistance and voltage are fixed. I assume that the batteries referred to are terminal batteries in which case it is obvious that instead of the deterioration of the battery at one terminal shortening the life of the battery at the other terminal or even exhausting it at all, it will have the opposite effect.

For example, let A and B represent the two terminals each with a battery of 100 volts working to a line of 2,000 ohms resistance, including the internal resistance of the battery which is immaterial for the purpose of illustration and therefore may be disregarded. This gives a total voltage of 200, and $\frac{200}{2,000} = \frac{1}{10}$ ampere, or 20 watts, ten watts from each battery. Then assuming that the battery at B has dropped to 50 volts the total voltage is then 150 and $\frac{150}{2,000} =$ .075 ampere, or 11.25 watts, showing 7.5 watts for the battery at A, thereby reducing its work one-fourth.

Were the battery at A increased to 150 volts to compensate for the loss of 50 volts at B, it is true that more cells would be required at A, yet no more work would be required of it than in the first instance, which is 10 watts. This is clearly sustained by Ohm's law governing current and work.

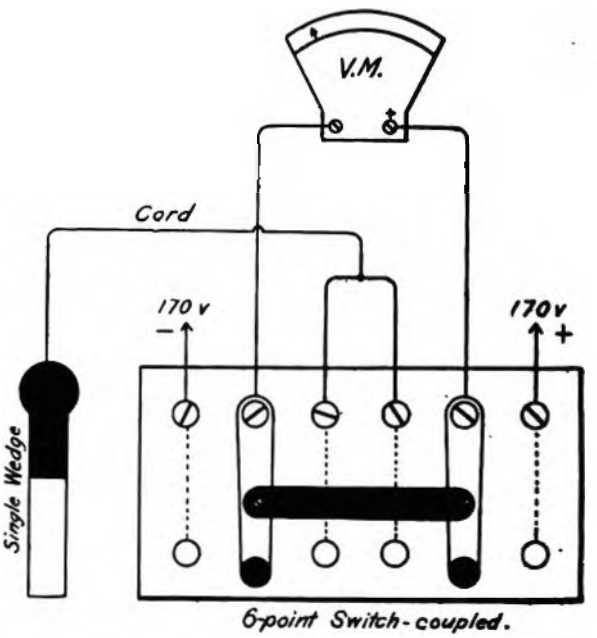
In a fifty-volt loss at B the current supplied to the line is reduced 25% and so remains until the battery at B can be built up or that at A is increased. In practice this condition generally obtains; that is, the defective battery really prolongs the life of the good battery where the latter is unvarying during such period of weakness and does not exhaust the good battery as the question and answer indicate.

Insulation Testing Apparatus.

BY R. W. A. HORNER, LYNCHBURG, VA.

The accompanying diagram shows the connections of a combination of simple apparatus for quick testing of line insulation. It consists of a voltmeter, a six-point switch and a single-conductor switch cord.

All that is needed to do is to insert the wedge in the spring jacks of the main switchboard with the brass side to the line underneath any wedges that may already be in the jacks. This connects the line directly to one polarity of the testing battery through the voltmeter, and with a throw



ARRANGEMENT OF SWITCHES FOR INSULATION TEST.

of the switch to the opposite side gives the reading of the other polarity, all of which is done without removing any plugs or wedges from the switchboard, thus keeping the existing connections intact.

This device is due to Mr. M. S. Cline, repeater chief in this office, and was suggested to him by the principle involved in the new Western Union volt-mil-ammeter testing apparatus, and it has proved a good method for quickly testing a number of wires. Its simplicity and the ease with which it can be mounted on the switchboard is obvious and it is offered to those who might care to use it until the standard testing apparatus can be installed.

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The Military Telegrapher in the Civil War.

PART LVIII.

An interesting story of the siege of Vicksburg and of the operations around Fort Donaldson, from a telegraphic standpoint, is told by Mr. James Q. Mason in recounting his military telegraph experiences during the civil war. Military telegraphers had peculiarly trying duties in the service, and were as much exposed to danger as the soldiers fighting on the line, because their work was largely of a pioneer character. The building and operation of telegraph lines in a country overrun with enemies required men of extraordinary courage and strength of character, and the records show, without any question in a single instance, that the military telegraph corps was composed wholly of such men.

Mr. Mason's contribution toward the record of the achievements of these brave men is reproduced in part as follows:

"I enlisted," he says, "in the Chicago Mercantile Battery August 7, 1862, as a high private, a privilege which was freely accorded to all able-bodied persons in those perilous times. I was ordered to Memphis, Tenn., November 1, after three months' camp life in Chicago. On arriving at Memphis I participated in the Tellahatchee march. General Grant was supposed to be marching from Holly Springs for Vicksburg and we were to form a junction with him somewhere in Mississippi. We, however, with General Morgan L. Smith were ordered back to Memphis, at which place we arrived after an absence of three weeks. We then proceeded down the river to Vicksburg and up the Yazoo River. After landing, a few hours' march brought us into position in the rear of Vicksburg. The commanding and musketry fire were very deafening and sharp. The shells went screeching over our heads in a manner that suggested grave thoughts and filled a fellow full to the brim with homesickness. I don't believe there was a man in our company that felt real well. Our battery was stationed on the extreme right, where it was said the enemy would undertake to break through and escape when driven from the fort (this was Sherman's attack on Vicksburg), but they were not driven from their position. After two or three days' hard fighting by our centre and left our army quietly withdrew in the stilly night, being firmly convinced, no doubt, of the truth of the old adage that 'He who fights and runs away, will live to fight another day.'

"From Vicksburg my company was ordered up White River to participate in the attack on Arkansas Post. In this our army was entirely successful, capturing about 13,000 prisoners. I had been very much under the weather for some time previous to this battle, and within a day or so after the fight I was compelled to take to bed with typhoid fever.

"This was the hardest service I experienced in my connection with the army. Five long weary months in the hospital, two at Jackson Hospital, Memphis, Tenn., and three in Fifth Street Hospital, St. Louis. I believe it was in June, 1863, that I was detailed from Fifth Street Hospital and ordered to report to Captain Samuel Bruch at Louisville, Ky., for duty. My memory of Captain Bruch is always fresh and green. He was a splendid man and a good and kind officer. I reported as ordered and Captain Bruch sent me to Captain J. C. Van Duzer at Nashville, Tenn. There is no need of eulogizing Captain Van Duzer. Every one who knew him liked him for his unquestioned ability and hearty, pleasant manner.

"Arriving at Nashville, Captain Van Duzer ordered me to Fort Donaldson. After eight months' service here at detailed wages of $13.00 per month, I was furloughed indefinitely by the War Department and thereafter Captain Van Duzer paid me operators' wages, ordering me to Nashville. After a month or two on the Huntsville, Ala., wire I was detailed to the Louisville circuit, which was an extremely lively string, with Zeph Morris at the Louisville end. After several months' pleasant, though hard, labor on that wire I was ordered to Cairo, Ill., as assistant manager of the joint military and civil offices. At this point I remained until the close of the war, the last four or five months of which I was manager and government cipher clerk, being routed out at night frequently by generals passing through who desired their messages ciphered. During all this time and until some time after the war closed Cairo was the jumping-off place, telegraphically speaking, and the business there, both military and civil, was very heavy. There were only four wires and the telegraph receipts were $3,000 or $4,000 per month. Military business for points south was all enveloped and sealed by the Cairo manager and sent down the river by steamboat captains, or, rather, in the captains' charge. All steamboat captains were obliged to report to the Cairo manager and receive a military telegraph clearance before they could proceed in any direction from Cairo. I was mustered out of the service August 8, 1865."

After the war Mr. Mason returned to active telegraph service, entering the employ of the Illinois and Mississippi Telegraph Company at Chicago. He afterwards became connected with the Western Union Telegraph Company and later with the Wabash Railroad as division operator, chief dispatcher and train master. Subsequently he entered the service of the Northern Pacific Railroad Company at Tacoma, Wash., as assistant superintendent of telegraph. Mr. Mason is now in the Western Union service in the Northwest.

When Mr. Carnegie Was a Telegraph Operator.—Leslie's Weekly of May 25 publishes an article by Mr. D. H. Bates of New York entitled "When Mr. Carnegie Was a Telegraph Operator." The story is given in connection with the description of the unveiling of the bronze tablet in Pittsburg in memory of the volunteers from Alleghany County, Pa., who served in the United States Military Telegraph Corps during the Civil War.

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Railway Test Boards.

Many railroads have installed and are adding from time to time telephone circuits along their rights-of-way, these being generally for message work, in addition to the train wires already in service. When a plurality of circuits of this type extend along a railroad, some means of testing the lines and locating trouble upon them is essential.

The test board shown in Fig. 2 consists of a number of jacks arranged in two parallel rows, with a grounding jack at the bottom. The lines are brought into these jacks and are carried through the board and out to the line again from the jacks on the other side. The wiring diagram, Fig. 1, illustrates how this is done. On telephone train dispatching circuits, jacks 1 and 3 and 2 and 4 are generally used for the train wire, while jacks 9 and 11 and 10 and 12 are employed for the message circuit. The selector and telephone sets are bridged across the train wire in one case through a key, and across the message wire in the other case through a key on the other side of the board. This apparatus is tapped off the inside contacts of the jacks so that when a plug is inserted in the jack,

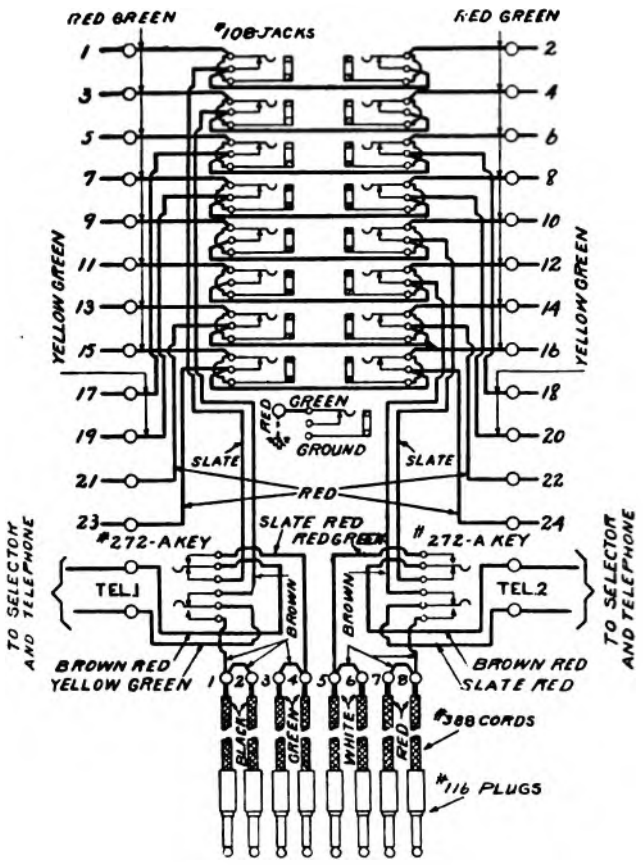

FIG. 1.—WIRING DIAGRAM OF TEST BOARD.

the selector and telephone apparatus is cut off and thrown across the cord circuits by means of the keys.

Inserting one cord of a given color in a jack and the other cord of the same color in the ground jack, grounds that wire. A pair of wires may be short-circuited by inserting cords of the same color in the two jacks to which those wires are connected. A wire may be opened by inserting a plug

FIG. 2.—GENERAL VIEW OF TEST BOARD.

in the jack, care being taken to see that the plug of corresponding color is not used elsewhere.

By means of this apparatus which is manufactured by the Western Electric Company, the greatest flexibility is given to the telephone lines in railway service, and it becomes possible to make all the simple tests ordinarily required on lines of this character.

"Gill Selectors for Telegraph Service" is the subject of a neatly gotten up pamphlet issued by the United States Electric Company, 284 Pearl Street, New York. The many uses to which these selectors may be put in telegraph service are set forth, and some excellent views of the apparatus are shown. The development of this selector is gone into historically, and its application and operation are stated very clearly, the diagrams of typical circuits being of a high order of the engraver's art. The selector is a very important part of the telegraph and telephone equipment of the up-to-date railroad.

In these days of rapid progress and development every operator should familiarize himself with the technical side of his work. Mr. Jones' book, "Pocket Edition of Diagrams and complete information for Telegraph Engineers," should be studied by all telegraphers. It is clearly written, in plain understandable English, and fully illustrated. When this book is mastered it fits the student for better positions in the service. The price is $1.50. Address Telegraph and Telephone Age, 253 Broadway, New York.

The Telegraph Intensifier Company has been organized at Denver, Col., with a capital stock of $50,000. The incorporators are: W. A. Deuel, C. C. Anthony, and C. A. Parker.

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How Faults on Telegraph Lines are Located.

(Concluded from page 355, May 16 issue.)

TO LOCATE A GROUND.

Select a good wire, which should, if possible, be on the same pole line as the defective wire; have this good wire looped back to the defective wire at the first convenient station beyond the fault. Connect the testing set to these wires at the home station by inserting the wedges *L*-1 and *L*-2 in the line spring jacks at the switchboard. With the exception of the special case to be mentioned later, *L*-1 should connect with the good wire and *L*-2 with the defective wire.

At the testing set, insert the connecting plug in the jack marked "Loop," which makes the connections as per Fig. 8. Adjust the rheostat *R* reading of the rheostat *R* as the "Varley" resistance. This figure represents the difference between the resistance of the defective wire from *L*-2 to *P*, and the resistance from *L*-1 to *P* around through the distant station, the latter comprising the total resistance of the good wire from *L*-1 to the distant station plus the resistance of the defective wire from the distant station to *P*. We therefore proceed to subtract the "Varley" from the "Loop" resistance and divide the remainder by 2; this gives us the resistance of the defective wire from *L*-2 at the testing station to *P*, the point at which the fault is located.

Having obtained this value, it is only necessary to convert the "ohms" (which in the case of a wire, may be considered an electrical measure

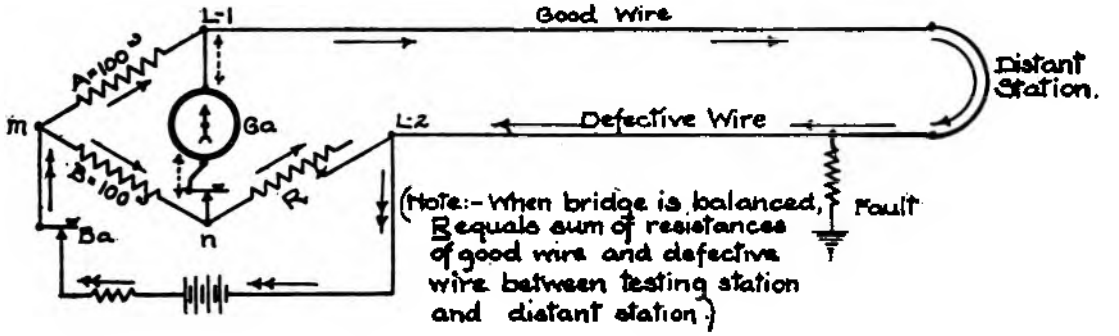

FIG. 8.—DIAGRAM OF CONNECTIONS FOR LOCATING GROUNDS.

until the galvanometer indicates a balance and record the reading of the rheostat as the "Loop" resistance. The presence of the ground has no effect in this case as the rest of the circuit is insulated and therefore none of the testing current flows through the ground.

Now transfer the plug to either of the jacks

of distance) into "miles" or "feet" in order that the lineman may know where to look for the trouble. This may be done in several ways. If the defective wire is of the same gauge throughout its length and has but a few hundred feet of cable in its make-up, we can simply divide the resistance in ohms from the testing station to

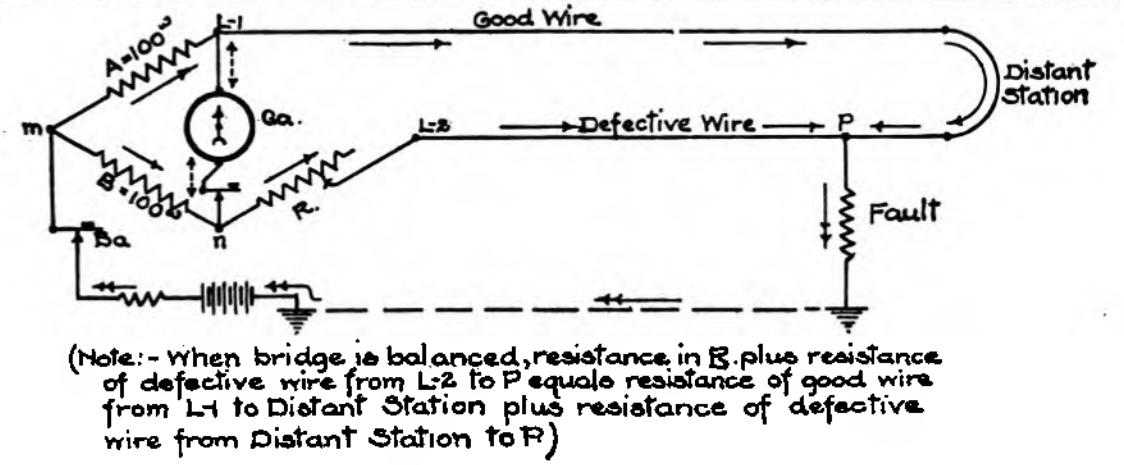

FIG. 9.—DIAGRAM OF CONNECTIONS FOR LOCATING GROUNDS.

marked "VG+" and "VG—"; if the fault has a positive ground potential the "VG—" jack should be used and vice versa. The connections will then be as per Fig. 9.

We now proceed to balance the bridge, and when this has been accomplished, record the

the fault by the number of ohms resistance per mile of the wire, and obtain a fairly accurate result, particularly if the trouble is but a few miles from the office. A safer plan, however, is to measure the resistance of the defective wire from the testing station to the farthest testing point

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to which it is O. K., and base our distance calculations on the resistance from that point to the fault.

The wire chief should frequently measure the individual resistances of the wires under his care, keeping a card or book record of these resistances between the various stations and under varying temperature conditions, etc. Such measurements can be taken at times when idle wires are available and are not only valuable for use in locating grounds or crosses, but often lead to the detection of poor joints, etc.

In general, it should be remembered that when trouble is found at a point other than the one shown by the location tests, either our calculations or the data on which they are based are almost certain to have been the cause of the error. In such cases the figures should be carefully checked, and every effort made to discover the incorrect values used, in order to avoid future difficulties of the same kind.

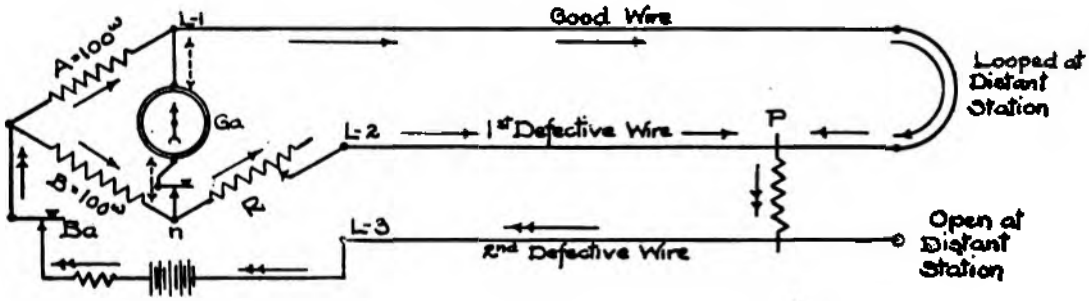

FIG. 10.—DIAGRAM OF CONNECTIONS FOR LOCATING CROSSES.

TO LOCATE A CROSS.

FIRST METHOD. — Where only one of the crossed wires is accessible to the testing station, the other wire or wires with which the accessible wire is in contact are grounded at any convenient point, thus converting the fault on the accessible wire into a ground. The trouble is then located as per the preceding instructions "To locate a ground."

SECOND METHOD.—Greater accuracy in locating crosses, particularly in wet weather, will be obtained by the following plan, known as the "Metallic Varley" test. This method should therefore be used in preference to the first method described, whenever two of the wires crossed together are accessible to the testing station. One of the crossed wires is looped back to a good wire, preferably on the same pole line, at the first convenient point beyond the trouble, and the loop thus formed is connected to the testing set at the testing station by means of the wedges *L*-1 and *L*-2. The other crossed wire is left open at the distant end, and at the testing station is connected to the testing set by the wedge *L*-3. If other wires are also crossed with the two mentioned, they are left open at both ends. At the testing set, the connecting plug is inserted in the "Loop" jack of the jack box, which leaves the wire connected to *L*-3 open and connects *L*-1, *L*-2 and the bridge in a manner similar to the arrangement shown in Fig. 8. The "Loop" resistance is then measured and recorded as per preceding instructions, after which the connecting plug is transferred to the "MV" jack. This makes the conditions as shown in Fig. 10. A comparison of the two figures will show that the connections of Fig. 10 differ from those of Fig. 9 only in providing a metallic return circuit from the fault at the point *P* to the battery *Ba*, instead of forcing the current to return from the fault at *P* through the earth to the battery *Ba*. This plan has the decided advantage of almost eliminating errors due to leakage.

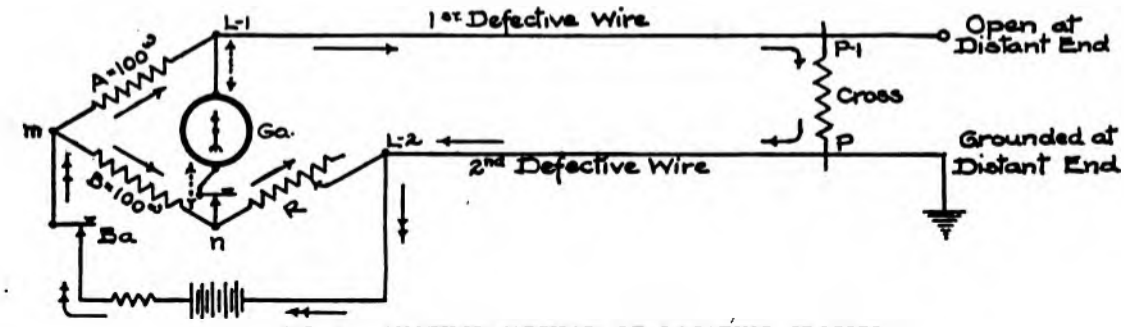

FIG. 11.—ANOTHER METHOD OF LOCATING CROSSES.

THIRD METHOD.—In some cases of crossed wires, it is impossible to apply either the first or second methods mentioned as there may be no available good wires between the testing station and the distant office. A good location can then be made by the following method, provided the

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resistance of the fault, that is, the resistance at the point or points of contact between the crossed wires, remains constant.

At the testing station, the two crossed wires are connected to the testing set by means of the wedges *L*-1 and *L*-2. The wire connected to *L*-1, which should be the one having the higher resistance if there is any difference between the two, is opened at the distant end; the wire connected to *L*-2 is grounded at the distant end. At the testing set, the connecting plug is inserted in the "Loop" jack, making the connections as per Fig. 11. The ground at the distant end being the

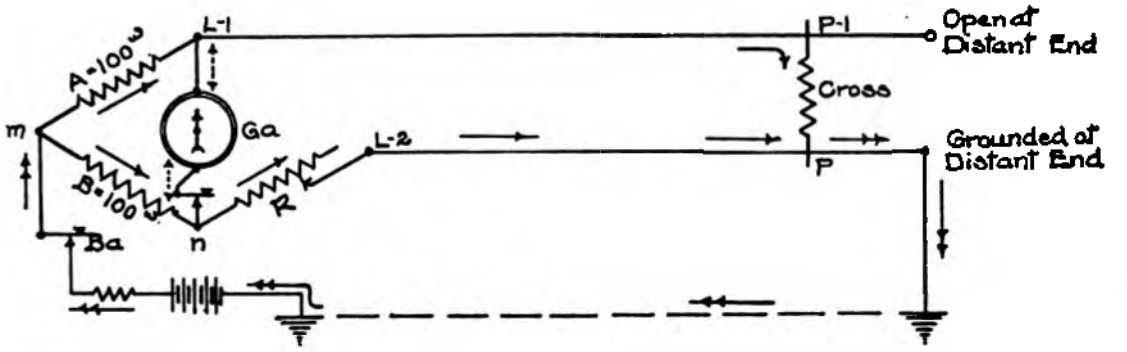

FIG. 12.—ANOTHER METHOD OF LOCATING CROSSES.

only one on the circuit, it has no effect on this measurement. A balance is obtained when the rheostat *R* is equal to the resistance between *L*-1 and *L*-2, which includes the wire between *L*-1 and the point *P*-1, the wire between *L*-2 and the point *P*, and the resistance of the cross itself at the points *P*-*P*-1. If a good balance is obtained without difficulty, that is, if the galvanometer needle shows no change for a few seconds after it has been brought to zero, it is fair to assume that the resistance of the fault is constant, and the reading of the rheostat *R* may be recorded as the "Loop" measurement. The connecting plug is then transferred to the "VG+" or "VG—" jack, using the "VG+" jack if the distant ground has negative potential and vice versa. The connections are now as per Fig. 12. It will be seen that for a balance under these conditions the resistance of the rheostat *R* must be such that when added to the resistance of the wire between *L*-2 and the point *P*, the sum will equal the resistance between *L*-1 and *P*, which includes the resistance of the wire from *L*-2 to the point *P*-1 and the resistance of the cross itself at *P*-*P*-1. In other words, the rheostat *R* represents the difference between the resistance from *L*-1 to the point *P* via *P*-1 and the resistance from *L*-2 to the point *P*. This reading of the rheostat may be recorded as the "Varley" measurement. It should be noted that the resistance of the wire beyond the cross, that is, between the point *P* and the distant end, does not enter into the measurement at all; this piece of wire, together with the ground connections, form the return circuit to the battery.

Calling the resistance from *L*-1 to *P* via *P*-1 the larger quantity, and the resistance from *L*-2 to *P* the smaller quantity, we have found that the sum of these quantities is the figure obtained in the "Loop" measurement, and the difference between these quantities is the "Varley" measurement.

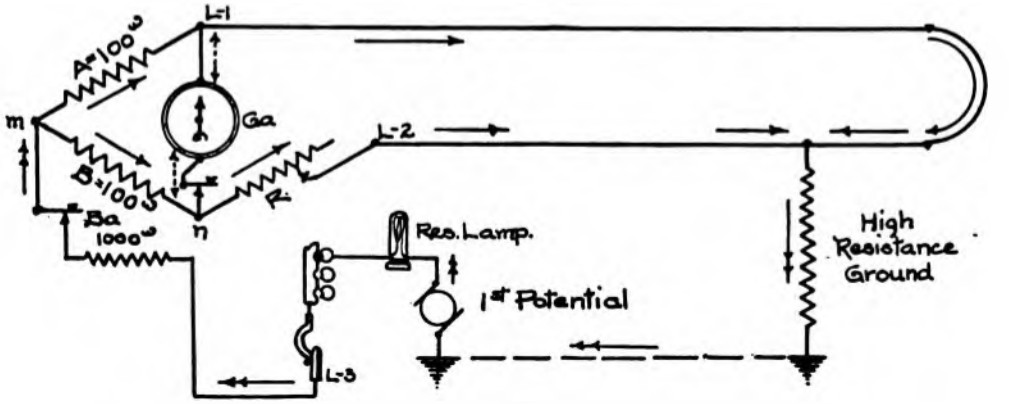

FIG. 13.—FIRST POTENTIAL SWITCHBOARD BATTERY TO BRIDGE.

HIGH RESISTANCE FAULTS.—Occasionally it will be found impossible to locate a fault by the foregoing methods, on account of the fault having an abnormally high resistance. Under such conditions the ordinary battery power used with the bridge causes such small deflections of the galvanometer needle that an apparent balance

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may be obtained with the rheostat set at any point within wide limits; that is, the needle does not respond to variations of an ohm or two in the rheostat, as it should for an accurate balance. It is then necessary to use a higher voltage testing battery, which may be done as follows: The connecting plug at the jack box is inserted in the jack marked "HV" instead of in jacks "VG+" "VG—" or "MV." This disconnects the regular bridge testing battery, but instead connects the point *m* of the bridge, through the battery key *Ba* and a resistance of 1,000 ohms, to the *L*-3 wedge at the switchboard. This is shown in Fig. 13 where, for the purpose of locating a high resistance ground, the *L*-3 wedge at the switchboard is connected to a switchboard battery tap of the first potential. The conditions for balance in this case are of course identical with those shown in Fig. 9 and the explanation accompanying it. Fig. 13 shows a first potential switchboard battery applied to the bridge; it is allowable, in extreme cases, to use a second potential tap for this purpose, but no higher voltage than that should ever be used. For locating a high resistance cross by the second or "Metallic Varley" method a higher voltage than that of the regular bridge battery may be applied.

Unsteady Galvanometer Needle.—As stated in the sections on locating grounds and crosses, the good wire used to complete the loop in all location tests, should be on the same pole line as the defective wire under tests, if possible. If, for any reason, this plan is not followed, it will be found difficult to secure a good balance, owing to the currents set up in the loop by induction from neighboring circuits and other sources; when the two wires forming the loop are on the same pole line, these disturbances are almost entirely neutralized by the compensating effect of one wire on the other. When a loop has to be formed of wires located on different pole lines, therefore, the needle of the galvanometer will be unsteady, that is, it will "drift" from side to side, or swing over to one side for a few seconds, etc. Securing a balance under these conditions requires some skill, but can be rendered much easier by shunting the galvanometer.

Swings.—When a fault is intermittent, it is often advantageous to loop a Morse relay in the battery branch of the bridge, with the relay points arranged to close the circuit of a sounder or vibrating bell so located as to be readily heard by the one handling the testing set. The *Ba* key is then held down steadily, but the *Ga* key is tapped only while the sounder or bell is operated by the closing of the relay, which indicates that the swinging fault is in contact with the wire under test. The relay used for this service will be wired to a wedge at the switchboard, which can be inserted in the spring-jack in series with the *L*-3 wedge when the connecting plug at the jack box is in the "MV" or "HV" jacks.

Broken Wires.—The loop tests described herein cannot be directly applied to a broken wire, i. e., a broken wire cannot be looped back to a good wire at the distant end, and a reliable location of the fault obtained. In most cases, however, the broken wire becomes crossed with another wire which is intact, and a location of the trouble can be made on the latter. When two wires break and their ends become crossed together without touching any other wires, it is often possible to apply the third method of locating a cross because one or both of the broken wires usually make a contact with the ground which will serve in place of the ground applied at the distant station.

New Method of Overcoming Inductive Disturbances.

Mr. Frank Fisher, of New York, was granted a patent on May 23 (No. 993046) for a "System of transmitting signals electrically through conductors." The device includes a means for relieving the receiving coil from inductive disturbances of any and every origin, the line coil being placed in an insensible zone.

One of the objects of the invention is to provide a system of transmission, using local earth, wherein the receiving instrument will not be affected by disturbances due to variations in the earth's potential, or from parallel lines carrying heavy voltage. It is especially applicable in multiplex telegraphy, whether aerial lines or submarine cables, and obviates the use of the return metallic circuit generally used in connection with the telephone, irrespective of the delicacy of the magnetic field.

An important feature is its application in connection with the Wheatstone bridge, wherein the resistance on opposite sides of the receiver may be permanently balanced, so as to avoid the necessity for frequent balancing the resistance affected by the difference of potential due to atmospheric or terrestrial alternations, or disturbances arising from the motion and action of electric trolley cars.

Another important feature is its merit as an effective lightning arrester.

Mr. Fisher is a consulting electrical engineer in New York, and was born in Birmingham, England, February 12, 1847. He began his telegraphic career in his native city in 1862 and has held positions of importance in the cable service in various parts of the world. He was at one time superintendent of the French Cable Company and vice-consul of France at Sydney, C. B. He represented that company in establishing its New York office on an independent basis and afterwards joined the cable-repairing steamer *Pouyer Quertier* as electrical engineer. He was one of the electrical engineers in charge of the shore ends during the laying of the French West Indian cables.

Any book on electrical subjects can be obtained through Telegraph and Telephone Age, 253 Broadway, New York.

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A Telegraph Superintendent's Problems

in these days of Telephone Train Dispatching, are telephonic as well as telegraphic.

Our organization, aside from its commercial basis, exists to serve you in both these fields. It brought out the Gill Selector, the pioneer and best-known device for selective calling, and the only selector successful from an operative and maintenance standpoint.

The members of our engineering staff are acknowledged leaders. Our energies are devoted entirely to electrical apparatus for railway service.

We know that telephone apparatus made for ordinary commercial use **will not be found satisfactory** in railway service. We are creating constantly new apparatus of special design and rugged character to meet the severest service requirements.

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STATISTICAL INFORMATION REGARDING TELEPHONE TRAIN DISPATCHING ON RAILROADS IN THE UNITED STATES AND CANADA.

NAME OF RAILROAD	Head of Telegraph System	Total Mileage	No. of Miles on which Trains are Dispatched by Telephone. (a) Single Track	(b) Double Track	Is an extension of the Telephone system contemplated?	Does the Telephone fulfill all requirements for train despatching purposes?
Atchison, Topeka and Santa Fe Ry.	L. M. Jones	9,332	5,138	618	Yes	Yes
Atlantic Coast Line R. R.	W. P. Cline	4,490	445		Yes	Yes
Baltimore and Ohio R. R.	Chas. Selden	4,449	68		Yes	Yes
Bessemer and Lake Erie R. R.	F. W. Smith	206	10	60	Yes	Perfectly
Boston and Maine R. R.	S. A. D. Forristall	2,243	181	50	Yes	Yes
Canadian Northern Ry.	W. E. Muir		68		Yes	Yes
Canadian Pacific Ry.	W. J. Camp	11,296	3,932		Yes	Yes
Central R. R. of New Jersey	F. G. Sherman	650	(See Foot Note.)		Yes	
Central Vermont Ry.	M. Magiff	536	150		Yes	Yes
Chesapeake and Ohio Ry.	C. W. Bradley (Acting Superintendent)	1,949	230	336	Yes	Yes
Chicago and Alton R. R. and Toledo, St. Louis & Western	T. M. Haston	1,530	0	0	Not this year	
Chicago and North Western Ry.	Wm. Bennett	7,630	*743		Yes	Yes
Chicago, Burlington and Quincy Ry.	V. T. Kissinger	9,040	*2,540		Yes	Yes
Chicago Great Western Ry.	G. O. Perkins	1,490	(See Foot Note.)			
Chicago, Indiana and Southern R. R.	W. L. Connelly	332	265	67		Yes
Chicago, Milwaukee and St. Paul Ry.	U. J. Fry	7,295	863	181	Yes	Yes
Chicago, Milwaukee and Puget Sound Ry.	U. J. Fry	1,803	698	28	Yes	Yes
Chicago, Rock Island and Pacific Ry.	J. G. Jennings	8,161	1,374	236	Yes	Yes
Chicago, St. Paul, Minn. and Omaha Ry.	Geo. Boyce	1,744	0	0	No	
Chicago, Terre Haute and Southeastern Ry.	F. H. Van Etten	372	(See Foot Note.)		Yes	
Cleveland, Cin., Chicago and St. Louis Ry.	C. S. Rhoads		867	425	Yes	Yes
Colorado and Southern Ry.	J. L. Henritzy	2,137	118		Yes	Yes
Delaware, Lackawanna and Western R. R.	L. B. Foley	956	449	507	Line entirely equipped	Yes
Denver and Rio Grande R. R.	J. M. Walker	2,500	44		Yes	Yes
Denver, North Western and Pacific Ry.	C. A. Parker	214	(See Foot Note.)		Yes	Yes
Indiana Harbor Belt R. R.	W. L. Connelly	59	12	48		Yes
Duluth, South Shore and Atlantic Ry.	J. S. Harland	589	0	0	No	
El Paso and Southwestern Ry.	H. W. Cutshall	902	0	0	Yes	
Erie R. R.	E. P. Griffith	2,227	103	104	Tentatively yes	Yes
Georgia R. R.	W. S. Brand	303	249		No	Yes
Grand Trunk Ry.	W. W. Ashald	4,745	310	0	Yes	Yes
Great Northern Ry. (see foot note)	E. J. Little	7,274	3887	101	Yes	Yes
Gulf and Ship Island R. R.	W. L. Oakley	306	0			
Houston and Texas Central R. R.	H. L. Bennett	1,020				
Illinois Central R. R. (Northern Lines)	F. T. Wilbur	3,019	750	365	Yes	Yes
Illinois Central R. R. (Southern Lines)	B. Weeks	†1,559	759	137		
International and Great Northern R. R.	C. W. L. Mickley	1,106	0	0	No	
Iowa Central Ry.	F. E. Martin	583	0	0	Recommended	
Kansas City Southern Ry.	R. L. Logan	843	0	0		
Lake Shore and Michigan Southern Ry.	E. C. Keenan	1,662	*895		Yes	Yes
Lehigh Valley R. R.	J. F. Caskey	1,433	*726		Yes	Yes
Long Island R. R.	L. S. Wells	395	0	0	No	
Louisville and Nashville R. R.	C. P. Phelps	4,591	881	Both Single and Double	Yes	Yes
Michigan Central R. R.	J. J. Ross	1,711	495	382	Yes	Yes
Missouri, Kansas and Texas Ry. System	W. H. Hall	3,072	66	See Foot Note	Yes	Yes
Missouri, Pacific Ry. System	E. A. Chenery	7,261	150	84	Yes	Yes
New York Central and Hudson River R. R.	A. B. Taylor	3,394	609	561	Yes	Yes
New York, Chicago and St. Louis R. R.	G. C. Todd	523	89	43	Yes	Yes
New York, New Haven and Hartford R. R.	N. E. Smith	2,500	100	0	No	Yes
Norfolk and Western Ry.	W. C. Walstrum	961	556	292	Yes	Yes
Northern Pacific Ry.	O. C. Greene	5,814	913	346	Yes	Yes
Oregon-Washington R. R. and Nav. Co.	E. A. Klippel	‡2,460	*182	See Foot Note	Yes	Yes
Oregon Short Line R. R. (see foot note)	B. F. Frobes	1,700		48	No	Yes
Pennsylvania Lines West of Pittsburg	G. A. Cellar	†4,915	51	75		
Pennsylvania R. R.	J. C. Johnson	†5,302	1,172	0		
Pere Marquette R. R.	Wm. M. Hayes		136	See Foot Note	Yes	Yes
Philadelphia and Reading Ry.	C. M. Lewis	3,489	0	0	No	
Pittsburg and Lake Erie R. R.	L. A. Lee	191	See Foot Note	0		
Pittsburg, Shawmut and Northern R. R.	C. L. Lathrop	240	66	0	Yes	Yes
Queen and Crescent Route	W. S. Melton	336	*137		No	Yes
Richmond, Fredericksburg and Potomac R. R.	T. R. Gooch	112	*112	See Foot Note	No	Yes
San Pedro, Los Angeles and Salt Lake R. R.	I. T. Dyer	1,040	(See Foot Note.)			
Seaboard Air Line Ry.	W. F. Williams	3,039	426	0	Yes	Yes

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St. Louis and San Francisco R. R.	H. D. Teed	6,004	750		300 miles This Year	Yes and more
Southern Railway	W. H. Potter	7,050	70	54	No	Yes
Southern Pacific R. R.	F. S. Rawlins	5,549	722	0	Yes	Yes
Terminal Railroad Assn. of St. Louis	F. E. Bentley	†37	15	10		
Texas and Pacific Ry.	Frank Tremble	1,885	None	None	No	
Toledo & Ohio Central R. R.	W. W. Ryder (General Superintendent)	440	*279		Yes	Absolutely
Union Pacific R. R.	J. B. Sheldon	3,427	429	163	Yes	Yes
Virginian Ry.	George Reith	475	475			Yes
Wabash R. R.	G. C. Kinsman	2,141	0	0	Yes	
Western Pacific Railway	J. P. Quigley	921	0	(Not at present		
Wabash, Pittsburg Terminal R. R.	C. O. Dambach	84	84			Yes

Oregon & Washington R. R. & Navigation Co.—Superintendent of Telegraphs has authority to construct 118 miles of telephone train dispatching circuit between Portland and The Dalles. Also 185 miles of telephone line from Portland to Seattle for ordinary railroad work as well as train dispatching.

Central Railroad of New Jersey is now installing a telephone system on 40 miles of New York & Long Branch Railroad.

Chesapeake & Ohio Ry. Co. will have completed by June 20, 274 miles additional between Old Point Comfort and Clifton Forge, Va., via Gordonsville and Charlottesville. For the budget next year there has been included in its estimate, an additional telephone train dispatching circuit of 124 miles between Ashland, Ky., and Lexington, Ky.

Oregon Short Line will be double-tracked probably within the next four or five years. This, with the block signals may render telephone installation for train dispatching purposes unnecessary. In any event there will be very little telephone installation until this work is done.

Pittsburg and Lake Erie R. R. will probably install telephone train dispatching service next year.

Seaboard Air Line Railway is now stringing 668 miles of additional telephone train dispatching circuit.

San Pedro, Los Angeles & Salt Lake R. R. Co. contemplates installing telephone train dispatching system in the near future.

Richmond, Fredericksburg & Potomac R. R. has a simplex blocking circuit covering the entire line.

Pere Marquette R. R. Co. has in contemplation and in course of construction 425 miles of telephone train dispatching circuit in addition to that already installed. The entire system will be equipped in the near future.

Chicago, Great Western is now installing telephone train dispatching system on 75 miles of double track and 172 miles of single track.

Chicago, Milwaukee & Puget Sound Ry. is now constructing 728 miles of telephone train dispatching circuit.

Chicago, Terre Haute & Southeastern Ry. is installing a circuit of 155 miles which went into operation June 1.

Denver, Northwestern & Pacific Ry. Co. is using the telephone conjointly with the telegraph for train dispatching.

Great Northern Ry. is now installing telephone train dispatching on 253 miles of single and 33 miles of double track.

Missouri, Kansas & Texas Ry. has ordered the materials for installing 700 miles of telephone train dispatching circuit this year.

Norfolk & Western R. R. has 100 miles of telephone train dispatching circuit now in course of construction.

El Paso & Southwestern System is using the composite telephone, known as the telegraphone, with excellent results. The use of this apparatus is responsible for the company's not having installed the train dispatching telephone, which no doubt will eventually be done as the advantage of the telephone is very apparent, and the operating department officials are very favorable to its adoption.

* Single and Double Track.

† 1910 figures.

‡ Oregon-Washington Railroad and Navigation Company, 1808 miles; Southern Pacific Lines in Oregon, 652 miles.

The Railroad.

Telephone Dispatching on Pennsylvania Branch Line.—The Pennsylvania Railroad Company will equip its Bellwood division with a telephone train dispatching system.

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

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.

Supreme Court Decision Against Tobacco Trust.—The United States Supreme Court on May 29 rendered its decision in the case of the Tobacco "trust" ordering the dissolution of the trust which is held to be a combination in restraint of inter-state trade. The trust was given the opportunity to reorganize under the immediate supervision of the Circuit Court of the second New York district.

Western Union in Kansas.—The litigation over the right of the Western Union Telegraph Company to do business in Kansas has been settled on the basis of a recently enacted law in that state. The new law requires foreign corporations to pay a charter fee on the actual amount of capital used in the state. Six years ago an effort was made to prevent the company from doing business in Kansas because it had not a charter, the company having refused to pay a charter fee on its entire capital stock. The Supreme Court reversed this law.

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Current Practice in Rules for Telephone Train Dispatching.

BY JOHN W. BARNEY OF NEW YORK.

A number of the railways of this country and Canada which have adopted telephone train dispatching have also issued rules and instructions governing the use of the new equipment. These vary from a few general statements in a half-dozen paragraphs, mimeographed, to be sent to employes, on one road, to the handsome, linen-bound pocket book of instructions issued by the Louisville & Nashville Railroad Company. On the Baltimore & Ohio Railroad these rules are incorporated into a 49-page book, covering block signal and interlocking as well as telephone rules. The Canadian Pacific Railway, the Delaware, Lackawanna & Western, the New York, New Haven & Hartford, the Lehigh Valley and the Lake Shore & Michigan Southern rules are admirably concise. Some of the roads, including the Great Northern, the Southern Railway, the Union Pacific Railroad and the Queen & Crescent incorporate in their telephone train dispatching instructions directions for patching circuits, while on other roads like the Erie, the Atlantic Coast Line and others, instructions in regard to patching are given orally by the inspector on duty, who is governed entirely by the circumstances in the individual cases. On the other hand there are a few roads which report no specific rules for telephone train dispatching, as it is found that the telegraph train dispatching rules will serve, the telephone being understood to be meant in cases where the telegraph is referred to.

In such survey and study of these rules as the writer has had occasion to make, three points stand out as insisted upon with practical unanimity as essential in rules governing this service. They are: the restriction of the train-order circuit, with more or less rigidity, to messages concerning train movements only; the elimination, and in some instances the prohibition of the use of the word "Hello" in answering telephone calls, and the necessity of repeating or spelling out certain parts of train-order messages to insure accuracy.

The train dispatcher, under the most of these rules is in absolute control of the train circuit and may assume control of the message circuit when circumstances require. The dispatcher's permission for the use of the train-order wire by officials other than his operators is required on the Atlantic Coast Line, the Louisville & Nashville, the Grand Trunk, the Central Vermont and the Evansville and Terre Haute. The Bessemer & Lake Erie excepts from the dispatcher's permission the superintendent, the assistant superintendent, trainmasters, train supervisors, the chief train dispatcher, the road foreman of engines and line foremen. The Georgia Railroad excepts the superintendent, trainmaster, traveling conductor and traveling engineer. The New Iberia & Northern allows employes to use the telephone circuit on permission from the agent or other person in charge of the telephone, and the Queen & Crescent rules state that the train dispatcher's circuit is to be used exclusively for handling train orders "excepting as may be directed by proper authority."

Following general directions requiring the dispatcher to write orders as he gives them and to underscore words as repeated back for verification, the requirements looking to the insuring of accuracy in recording these oral communications agree upon the principle of verifying by spelling out or by repetition words upon which there is a possibility of error in comprehending, while they differ considerably in the means by which the desired safeguards are to be obtained.

Some of these differences have evidently grown out of the isolated individual formulation of rules and are not significant as tending to establish principles. The requirements of repetition by spelling or otherwise cover, generally, order, train and engine numbers, and station names, and in some cases are extended to cover track numbers and names of conductors. The larger number of roads using telephone train dispatching require that names and figures shall first be pronounced and then spelled out, while about a quarter as many roads call for the spelling first and the pronouncing later. Two roads call for the pronouncing and repetition of names and numbers without requiring the spelling out, two others call for spelling without providing for the sequence of operations or the manner of spelling, and one line requires only the repetition of figures but does not provide for spelling out, nor indicate the manner in which they are to be repeated. One road appears to be supercautious in reversing its requirements for the two classes of figures. Thus time figures are required to be first spelled and the numerals then pronounced, while train and engine numbers must first be pronounced and the figures then duplicated.

In the treatment of the cipher, practice varies, a number of roads calling for the spelling out "n-a-u-g-h-t" or "n-o-u-g-h-t," while a smaller number use "o," in one instance the rule calling for the use of the syllable "Oh."

In multiples of ten some of the principal roads spell out as one word, thus: "f-o-r-t-y," while others require "f-o-u-r-O" or "f-o-u-r n-a-u-g-h-t." One road, however, directs that ten shall be spelled out as "o-n-e O."

In double numbers the rules show variations. The number 12 may be sent as "t-w-e-l-v-e" or as "o-n-e t-w-o" under differing rules and in such numbers both the examples following are authorized and required by different rules: "52. f-i-v-e t-w-o," "92, n-i-n-e-t-y t-w-o."

In larger numbers 100 may be spelled: "o-n-e n-a-u-g-h-t n-a-u-g-h-t" or "o-n-e d-o-u-b-l-e O." One thousand may be spelled, according to one set of rules: "o-n-e t-r-i-p-l-e O."

In mixed hundreds, in figures like 305, for example, "naught" or "O" are good practice, according to different rules. One road authorizes the spelling of mixed numbers of three places as: "o-n-e e-i-g-h-t-y s-e-v-e-n," while the larger number of roads require, in such cases, the spelling of each figure separately.

In numbers of four places opinion seems to be divided, according to the rules at hand. The fol-

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lowing examples of authorized practice are taken from the several instructions, the hyphen denoting those words required to be spelled a letter at a time:

2550. t-w-o f-i-v-e f-i-v-e n-a-u-g-h-t.

Fi-f-t-y n-i-n-e n-i-n-e-t-y e-i-g-h-t, Five, nine, nine, eight.

O-n-e t-h-r-e-e o-n-e f-i-v-e. Thirteen fifteen.

2835. 2-8-3-5. Twenty-eight, thirty-five.

In time numerals the general practice seems to be to follow colloquial usage in spelling out hours and minutes, time being given in minutes past the hour, as: "1 o-n-e hour 45 f-o-r-t-y f-i-v-e minutes;" "6.15, s-i-x f-i-f-t-e-e-n."

Many of the rules insist upon the exercise of the utmost care to obviate liability of misunderstanding or error. Two companies, the Southern and the Northern Pacific, have endeavored to guard against phonetic pitfalls due to the similar sounds of P, B, T, D, etc. The Southern rules suggest that the alphabet be scaled in such cases, as: P., N, O, *P*; B., A, *B*; while the Northern Pacific rules direct the spelling out of the letter for identification, thus: T., tea; B., bee; C., see, etc.

Although a number of the rules require the use of a conversational tone of voice in transmitting orders and reports and impose care in the use of the telephone, and a prescribed position with respect to the mouthpiece of the transmitter, the important subject of the use of the instrument is treated in none of the rules more fully than in the booklet of the Louisville & Nashville Railroad Company. One of the commonest faults in the use of the telephone is the failure to speak properly into the transmitter. The need of instruction is so general as to warrant the mention here made, which is drawn mainly from the Louisville & Nashville rules.

It is not necessary to talk in a loud or sharp tone of voice into the telephone transmitter, as the only result will be to confuse the voice vibrations and render the utterance unintelligible to the receiver. For the best results the mouth of the speaker should be within about one-half inch of the mouthpiece of the transmitter and the speaking should be in a tone somewhat lower than in ordinary conversation. Words should be pronounced slowly and distinctly, a monotone being recommended, with no emphasis or inflection. It is desirable that all syllables should be pronounced without slurring, while the "r's" may be slightly rolled, as we hear from central station operators in the larger cities. While speaking the mouth must not be averted from the instrument, as the vibrations will then fail to enter the transmission orifice and be lost. The position of the transmitter mouthpiece should be inclined slightly upward from the horizontal. Under no circumstances should the diaphragm of the transmitter be hit or touched.

The receiver should set snugly against the ear, not only to prevent the entrance of external noises, but because the increase by even the fractional part of an inch of the distance of the diaphragm from the ear may be equivalent to the loss in transmission efficiency represented by a hundred or more miles of wire. If, when the foregoing requirements are observed, the message cannot be heard plainly, the fault is on the line or in the receiver, though seldom in the latter. If the receiver is at fault, the rubber cap should be removed and the magnet terminals examined and cleaned of dust or dirt. Care must be exercised in handling the diaphragm to avoid denting or bending it in the slightest degree. It should be handled as little as possible. In cases where it is surmised that the magnetic strength of the armature has failed it may be tested by taking the metal diaphragm and placing its edge across the magnet poles. If it is supported while the receiver is held in an upright position, the magnetic action is good; but if not, the receiver should be removed immediately and a good one substituted.

Receiver and transmitter cords should never be twisted or allowed to remain in that condition, if so caused by accident. The small wires inside the cord will become broken and make the telephone noisy and unsatisfactory. A defective cord may be detected by holding the receiver to the ear and shaking the cord. If it is broken or not making perfect contact, it causes a grating noise in the receiver. No weights or pulleys should be attached to the cords under any circumstances, and no moisture should be allowed on or near them.

Frequent inspection of binding posts is necessary. A loose connection, while it may not cut out the service altogether, will lower transmission and make the telephone unsatisfactory. The telephone must not be allowed to come in contact with telegraph keys or other telephone instruments. Metal articles should never be placed on or near the telephone instruments; such articles are likely to short circuit the apparatus and cause trouble.

The rules do not alter the force of the "O. K." or "Complete" of the telegraph service, but they agree substantially upon "Right" or "All right" as acknowledgment of an order, and on brevity of statement in answering calls, both on the part of the dispatchers and operators. They are at practical unity in forbidding any changes by operators in the wiring or equipment of the telephone train dispatching service and in requiring the prompt reporting of all trouble on the circuit to the dispatcher.

How to Remove Crystallized Copper and Blue Stone from Battery Jars.

Mr. G. B. Still, operator for the Southern Railway at Lima, Va., has found an easy way to remove crystallized copper and blue stone from the bottom of battery jars without breaking the jars. He recommends placing the jar in the sunshine upside down on a board for thirty-six to forty-eight hours. The crystals will separate and fall from the bottom of the jar. If the mass is tightly set, the whole will slowly slide down to the mouth of the jar and by slightly shaking the mass will fall out. This information comes to us through Mr. H. C. Worthen, general superintendent of the Western Union Telegraph Company at Atlanta, Ga., who no doubt considers it of value to those interested.

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Radio-Telegraphy.

Long Distance Wireless.—A wireless message was transmitted from Glace Bay, N. S., to Dakar, Western Africa, on May 26, by way of the Eiffel Tower in Paris.

To Regulate Wireless.—The wireless telegraph companies are urging the passage of the bill now before Congress looking to federal regulation of wireless telegraphy in order to eliminate the present evils.

Wireless in South Africa.—The new wireless telegraph station erected by order of the Union Government of South Africa was opened on May 10. The station is situated at Slangkop, south of Cape Town.

Wireless Transmission from Flying Machine.—A former telegrapher named Parmalee, now an aviator, took a wireless outfit with him on one of his flights at Columbus, Ohio, recently and transmitted messages to the judge's stand.

Wireless Plant for the University of Michigan.—A wireless telegraph plant is being installed at the Michigan University, Ann Arbor, Mich. The plant is to be used for instruction purposes and will be operated in connection with the station at Ypsilanti.

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. An appeal was taken on a writ of error. Mr. S. S. Bogart, vice-president of the company, was sentenced to pay a fine of $2,500.

How to Obtain Wireless Operator's Certificates.

In our issue of May 16 we printed the Wireless Ship Act which will go into effect July 1, and which provides that wireless operators on ships shall be required to pass an examination as to proficiency. Operators intending to qualify for such positions would be advancing their own interests by studying some reliable work on wireless telegraphy. An excellent book on this subject is Bishop's "Wireless Operators' Pocket Book of Information and Diagrams." The price of this book is $1.00 per copy and it may be obtained of Telegraph and Telephone Age, 253 Broadway, New York.

Wireless Stations of the World.—According to statistics published by the International Bureau of the World's Telegraph Union, there were 1,217 stations for wireless telegraphy at the beginning of 1911, as compared with 755 at the opening of the preceding year; 219 of the former were coastal stations, and 998 were stations on board ship. The United Kingdom is credited with the possession of the largest number, as represented by 450 stations; Germany ranks second with 224, and France third with 167 stations, all other countries combined only having 376, or less than the United Kingdom alone. The international agreement in regard to wireless telegraphy which was concluded in 1906, at Berlin, by twenty-seven countries, has been ratified by 20 of them. The countries which have not ratified the agreement are Argentina, Chile, Greece, Italy, Persia, Uruguay and the United States. Since the conclusion of the agreement accessions have been made by the inclusion of the Australian Federation, New Zealand, the South African Union, British India, and the remaining British Colonies and Protectorates with the exception of Newfoundland. A supplementary agreement has been made to the original treaty, but the former has not been accepted by Great Britain, Japan, Portugal, the French Colonies, Germany and the Dutch Indies.

Examination of Wireless Operators.

As showing the proficiency of the average wireless telegraph operator it is interesting to note that nearly everyone who has been called upon to take the government test at the Brooklyn Navy Yard has satisfactorily passed a rigid examination. Chief gunner W. H. F. Schluter, U. S. N., assistant to the officer in charge of the electrical class at the Navy Yard, is conducting the examinations. He is thoroughly competent, having been on duty with the class for about two years. The time required for the examination is from four to five hours. This would go to show that in a very short time a most efficient class of operators will be employed in the wireless service. Telegraphers who have not a good record for proficiency will under no circumstances be given a government license. The license is good for two years and is divided into three grades, i. e.: good, very good, and excellent. At the end of each two-year period the license must be renewed. It is hoped that the new national wireless law, which will go into effect July 1, will definitely determine the status of the wireless representative on board of vessels.

It is stated that 250 or 300 experimenters, or amateur operators, have applied to take the government examination, but the officials do not favor accepting their applications unless they bear a certificate from one of the wireless companies showing that they are actually in the employ of a company or seeking employment. This is no doubt done to protect the employes in the wireless service.

The examinations are held in the rooms of the Electrical Club at the Navy Yard on Tuesdays and Thursdays at 10 a. m. All the operator needs to take the examination is to present a letter from the company employing him or with which he seeks employment. The examination is open to all operators employed by or seeking employment by any wireless or steamship company, and this means shore as well as ship operators.

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Locking Feature for Improved Buffalo Grip.

The Western Electric Company has recently placed on the market a new "Improved Buffalo Grip" with a special locking feature. In Fig. 1

FIG. 1.—BUFFALO GRIP WITH JAW HELD OPEN BY NEW LOCKING DEVICE.

the new grip is shown with the jaw held open by the locking device. A turn of the handle locks the jaw in any position and enables the lineman to easily and quickly insert the wire in the grip. When

FIG. 2.—GRIP CLOSED.

the handle is pushed down, as shown in Fig 2, the wire is held in a tight grip.

The "Improved Buffalo Grip" is made in various sizes for both bare and insulated wire, and can be supplied both with and without pulleys.

The Pueblo Southeastern Telegraph and Telephone Company has been incorporated at Denver, Col., with a capital stock of $50,000. The incorporators are W. D. Garwood, B. H. Talmadge and John H. Voorhees. This company is connected with the Pueblo Rockyford Land and Irrigation Company in the furtherance of its project of irrigation in the territory about Pueblo. A new town, named Wilson, has been established by the Irrigation Company, 16 miles from Pueblo, and is connected with Pueblo by the lines of the Pueblo Southeastern Telegraph and Telephone Company. At the present time there is a pole line of three wires throughout the Irrigation Company's property covering reservoirs, dams, etc. There is also a telephone line about 75 miles in length. A railroad is being built by the same interests between Pueblo and Wilson. The telephone lines are connected with the office of the Colorado Telephone Company.

Railway Telephony.

Apparatus to fill every requirement of railway telephone service is listed in bulletin No. 1080, "Railroad Telephone and Selective Apparatus," just issued by the Western Electric Company. The selector and selector set for local and common battery signaling are described in detail, and the advantages of the company's standard telephone and selective equipment are clearly stated. The bulletin contains fifty-six pages and lists, together with full information as to types and prices, a great variety of apparatus.

Selective Signaling.—"Absolute Safety by Selective Signaling" is the title of Bulletin No. 702 issued by the United States Electric Company, New York. It contains a history of signaling and goes into the modern practice at considerable detail. The Bulletin is well illustrated with artistically finished half tones of semaphore boxes and apparatus, circuit diagrams, etc., and is well worth the time of careful reading by any one interested.

Insulators. — The Brookfield Glass Company, New York, has just issued an attractive catalogue of its varied line of screw glass insulators and knobs for all purposes. It is illustrated with full size views of insulators, each illustration being accompanied by dimensions and other trade information. Glass knobs are also treated in the same manner. Mr. B. M. Downs, vice-president of this company, is well known to the telegraph fraternity.

Telephone Dispatching on Columbia and Puget Sound R. R.—The Columbia and Puget Sound Railroad has ordered from the Western Electric Company at Seattle, Wash., selectors and associated telephone apparatus for a circuit about thirty miles in length. The dispatcher for this line will be located at Seattle. Five way station telephone equipments will be installed. The line will be constructed of No. 10 gauge hard drawn copper wire.

Electrical Material for the Panama Canal.—The Isthmian Canal Commission is inviting proposals to furnish electrical material for use in the canal work for the year ending June 30, 1912. The material includes fittings, batteries, wire, cable, cross-arm pins, insulating material, etc. Those desiring to submit bids should address F. C. Boggs, captain, Corps of Engineers, U. S. A., General Purchasing Officer, Washington, D. C., naming circular No. 632.

War Experiences of a Telegrapher Shown in Pictures.—Mr. R. B. Griffin of Napa, Cal., an old-time telegrapher and member of the United States Military Telegraph Corps during the war, has published a story in book form in which he gives an account of his military telegraph experiences. A love story is interwoven in the narrative. The story is being illustrated for moving picture shows.

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Dinner of the Commercial Managers Association of Greater New York.

The last of the Spring series of dinners of the Commercial Managers Association of New York of the Western Union Telegraph Company in Greater New York was held at the St. Denis Hotel, on Wednesday evening, June 7, and was a brilliant and successful function. The entire commercial forces of the company were present, including the lady managers in the city offices and the presence of the ladies aided materially in the great success of the occasion.

Mr. P. J. Casey, president of the association, acted as toastmaster.

Mr. Belvidere Brooks, general manager of the company, was the guest of honor, and seated at the guest table with him were Mr. E. M. Mulford, division commercial superintendent; Mr. W. N. Fashbaugh, traffic engineer; Mr. S. M. Williams, manager of the Commercial News Department; Mr. A. C. Kaufman, commercial agent of the Eastern Division; Mr. W. A. Sawyer, district commercial superintendent, First District; Mr. John A. Hill, division traffic superintendent; Messrs. D. Skelton and Thos. E. Fleming, of the American District Telegraph Company; Mr. M. W. Hamblin, special agent of the Metropolitan District; Mr. Wm. A. Porteous, manager at New Orleans, accompanied by Mrs. Porteous; Mr. B. H. Reynolds, superintendent of the Central and South American Cable Company; Mr. P. J. Casey, president of the organization, and Mr. J. F. Nathan, commercial superintendent.

The novel social feature of the evening was the successful carrying out of the duty imposed on every district commercial manager that all local managers and commercial forces in their territory should meet and become acquainted with the managers and forces in adjoining territories. The success of this plan was fully demonstrated in the hearty good fellowship which prevailed and remarkable for the fact that it seemed to overcome any trace of restraint or embarrassment, thus assuring to all present a most enjoyable evening. This duty devolved upon the district commercial managers, Messrs. John Simmonds, J. J. Riley, C. B. McCann, Frank Spree, M. J. Hayden, John Veitch, M. E. Pierce, P. Kinman, J. W. McMahon and J. T. Carberry. Mr. A. G. Saylor, general superintendent, was chairman of the reception committee, and was ably assisted by Misses M. E. Saunders, N. C. Loughlin, H. A. Samsony, A. Burns, A. Reed, H. B. Hoff, A. Lupka and M. Morrissey; Messrs. Frank Spree, M. J. Hayden, P. Kinman, C. B. McCann and J. T. Carberry, all of whom contributed greatly to the pleasure of the occasion.

At the conclusion of the dinner a recess was taken and a reception tendered Messrs. Brooks and Mulford. Both officials were introduced to every lady and gentleman present.

Mr. J. F. Nathan was the first speaker of the evening and his remarks upon "Co-operation in the Telegraph Service" were delivered in a manner befitting the speaker and the company he represents.

Mr. E. M. Mulford followed Mr. Nathan, his subject being "The Commercial Organization of the Eastern Division." Mr. Mulford spoke at length on the work accomplished and that under way and his remarks were enthusiastically received.

Mr. Belvidere Brooks, the next speaker, carefully reviewed the work being accomplished by the company and in his characteristic and genial way indicated the feeling of the corporation toward its employes, assuring them of his hearty personal interest in their welfare and his firm belief that it was the company's purpose to faithfully carry out the promises made. Mr. Brooks' happy manner and thought impressed all present most forcibly and his remarks were received with great enthusiasm.

Mr. S. M. Williams followed, and his address, "The Ladies and Their Essential Relation to the Telegraph," won all present. His clippings from the "Society Column" were unique and most original.

Mr. A. C. Kaufman spoke on the subject, "Concerted Effort Applied to the Telegraph," and spoke in his usual forcible and emphatic manner, assuring those present that it was the intention of the company to help them in every possible manner to overcome the obstacles which might confront them and that he would make it a part of his duty to give his personal aid to any and all who might ask it.

Mr. W. N. Fashbaugh was the next speaker. He pointed out that the traffic department stood ready at all times to assist the commercial department in accomplishing the aims they had in view.

Mr. W. A. Sawyer, when called upon, stated that he had come prepared to make a speech and that his only regret was the fact that he was so far down on the line that his speech had been all shot to pieces by the speakers who had preceded him. Consequently they had left nothing for him to say. He told how meetings of a similar character were being carried on all through the field; the relationship of these meetings to those of the New York Association, and the successful results that were being accomplished thereby.

Mr. W. A. Porteous, manager of the New Orleans office, expressed his pleasure at being present and with true Southern courtesy addressed his remarks principally to the ladies.

Mr. Thomas E. Fleming, of the Messenger Service Department of the company, was called upon for a few remarks, and acquitted himself in his usual resourceful fashion. His facetious replies to numerous quips levelled at him provoked much merriment.

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Messrs. D. Skelton and B. H. Reynolds spoke briefly on matters connected with the service.

The meeting closed with an ode dedicated to the general manager and written for the occasion by "Jimmy" Felsenheld, attached to the commercial superintendent's office. It was well sung by Joseph Matier.

Following is a list of those present:

W. J. Ackerley, A. K. Ainlay, W. F. Alcock, A. Anson, Miss A. Antonius.

L. S. Badgley, S. Bollaban, Fred. Bollman, Miss Barry, C. A. Bauer, L. D. Beall, J. W. Behre, Miss Benson, B. F. Benson, Miss Bergman, J. A. Berry, J. A. Boland, J. S. Bradbury, Miss Brennan, C. J. Bresnan, M. J. Brooks, B. Brooks, R. Brown, Miss Browman, Miss E. Burke, Miss Burns, A. J. Burton, G. W. Blanchard.

J. Cahill, J. T. Carberry, Miss Casey, P. J. Casey, L. Cohen, Miss Corbett, F. E. Coyle, J. J. Cummings, Mrs. Curtis.

R. I. Dawson, A. Disney, Miss Donohue, Miss K. T. Donohue, D. Drew.

H. S. Earle, J. J. Earle, J. W. Egan.

W. N. Fashbaugh, N. Feder, Jas. D. Felsenheld, L. Fideldey, A. N. Fisher, J. Fleming, T. E. Fleming, T. F. Flynn, W. S. Fowler, D. Fuch.

R. F. Geissler, Miss Gerber, F. D. Giles, J. J. Gilroy, Jos. Goldstein, K. Goldman, Miss Gottschalk, M. M. Greene, P. E. Grogan, E. Guthrie.

S. Hackett, M. W. Hamblin, M. J. Hayden, C. A. Harvey, Miss Hayes, Miss Hecker, H. Herrmann, Miss Hills, E. G. Hohenstein, Miss H. B. Hoff, T. F. Hull, Miss Hyland.

N. W. Jacobs.

Miss Kaiser, Miss M. A. Kane, Miss N. Kailey, A. C. Kaufman, L. Kenny, A. L. Kaufman, Miss Kearney, Miss Kimball, Miss E. Kircher, P. Kinman, Mrs. S. K. Kirchbaum, J. Kistler, Miss E. Koch, F. J. Lantry, J. Lauermer, J. J. Lee, W. Levy, B. Liebowitz, A. Lister, Miss Loughlin, Miss Lougran, Miss Lupka, H. Lupka, D. Lynch, Miss Lyons, Miss Lyddy.

J. Matier, R. F. Martin, M. H. Megie, Miss Morrissey, E. M. Mulford, J. H. Murphy, R. F. Murphy, W. A. McAllister, C. B. McCann, Miss McEvily, J. P. McGovern, J. P. McGowan, J. J. McGrath, J. W. McMahon, Miss McNally, J. McNeil.

J. F. Nathan, E. B. Nieman, F. J. Nilan, R. J. Nimmons.

Miss O'Dea, Miss O'Donnell, Geo. Otten.

T. T. Parr, M. E. Pierce, Miss Pollak.

R. Raphael, Miss Reed, Sam'l Reiss, B. H. Reynolds, L. Ribler, M. J. Rivkind, J. J. Riley, Geo. Roehm, M. Russnow.

Miss H. Samsoney, Miss Samsoney, Miss Sands, Miss Saunders, W. A. Sawyer, Miss Scully, C. F. Seelman, W. H. Sembler, J. J. Shelley, Chas. E. Shelley, W. A. Schudt, A. D. Shaw, J. E. Shields, S. Silberstein, A. Simon, J. Simmonds, D. Skelton, V. M. Sozzi, Frank Spree, Miss Smith, Harvey Smith, Miss Stiles, Miss Stork, Miss Sullivan, P. J. Sullivan.

P. J. Tierney, F. Tevenan.

Miss Van Vleit, J. Veitch, M. P. Vrabel.

Miss Wagner, Miss Wall, L. A. Westrope, Miss White, O. L. Whitoneck, H. F. White, Miss Wilde, Miss Williams, S. M. Williams, J. N. Wintross, Miss Wocktell.

Miss Yorker.

O. Zilly, Miss Zimman.

Arrangements for Old Timers' Convention.

At a meeting held in Philadelphia on May 27 of members of the Old Time Telegraphers and Historical Association and of the Society of the United States Military Corps, the necessary arrangements were made and committees appointed to carry out the details of the joint convention of the two associations which will take place at Atlantic City on September 5, 6 and 7. Among those present were: Col. William Bender Wilson, president of both associations; Mr. F. J. Scherrer, secretary of the Old Timers'; Mr. Charles E. Bagley, vice-president of the Old Timers, and Messrs. J. W. Reed, J. A. McNichol, John Wintrup, G. W. Deetz, F. E. Maize and J. B. Taltavall.

Following is the programme agreed upon, subject of course to change:

Tuesday, September 5, morning, 10 o'clock.—Joint meeting in the convention hall of the Marlborough-Blenheim, called to order by the retiring president of the Old Time Telegraphers and Historical Association, Mr. W. J. Lloyd of Chicago; installation of the new president, Col. W. B. Wilson of Philadelphia; address of welcome and response; business meeting United States Military Telegraph Corps; business meeting Old Time Telegraphers and Historical Association; afternoon, roller chair parade; evening, concert and entertainment on Steel Pier.

Wednesday, September 6, morning.—Ocean sailing; afternoon, trolley party to Ocean City; evening, concert and theatre entertainment on Million Dollar Pier.

Thursday, September 7, morning—Ocean bathing; afternoon, go as you please; evening, banquet at the Hotel Shelburne.

The reception committee of the United States Military Telegraph Corps is composed as follows: Messrs. Jesse W. Crouse, chairman; Richard Graham, John Wintrup, Isaiah D. Maize, of Philadelphia; Henry H. Atwater, William L. Ives, George M. Huntington, Marion H. Kerner, Frank A. Stumm, Charles W. Pearson, Alfred Winder, Thomas T. Eckert, Jr., David H. Bates, Jr., Verdie J. Knittle, Albert Eckert Chandler, of New York, and Thomas Wallace Wilson, of Atlantic City, N. J.

Adapting Chinese Characters to the Telegraph.—The difficulties of adapting the Chinese language to the telegraph has always been a perplexity, but a solution to the problem seems to have been found by a Danish professor who has codified the 7,000 commonest Chinese characters representing them by numerals. Thus the Chinese word for "cash" is represented by the figures 6030.

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Exhibitors and Representatives at the Boston Convention of Railway Telegraph Superintendents.

The various manufacturing and other companies interested in railway telegraphy and telephony will be represented at the Boston convention of the Association of Railway Telegraph Superintendents, June 26-30.

J. H. Bunnell & Co., New York, will be represented by Mr. J. J. Ghegan, president.

The Sandwich Electric Company, Sandwich, Ill., will be represented by Mr. H. O. Rugh and competent assistants.

Mr. W. E. Athearn, engineer of equipment of the Western Union Telegraph Company, will be at the convention to represent that company's interests.

The American Telephone and Telegraph Company, New York, will be represented by Messrs. B. A. Kaiser and G. W. Peck, of New York; Mr. Albert Douglass, of Chicago, and Mr. Henry Homer, of Philadelphia.

The American Typewriter Telegraph Company, New York, will give a practical demonstration of the Cardwell printing telegraph system on a wire from Boston to Providence and return. The company will be represented by Dr. G. A. Cardwell, the inventor of the apparatus and president of the company, and Mr. Willard M. Miner, electrical engineer.

The United States Electric Company, New York, will have its convention headquarters in parlor G on the main corridor of the Hotel Brunswick, and will have an exhibit of the Gill selector and other railway telephone dispatching appliances. Its train order and other signaling, based on absolute control by the dispatcher, will be demonstrated. The company will be represented by Mr. Charles Sigison, treasurer, and Mr. W. E. Harkness, assistant general manager, New York, and Mr. W. H. Cook, sales engineer, Chicago.

The Western Electric Company will have a complete display of railway telephone and selector equipment in parlor "E" of the Hotel Brunswick.

Here will be shown a working exhibit of selector equipment, as well as practically every kind of telephone apparatus used in the railway world. A feature of the exhibit will be the long life or endurance test which the Western Electric Company has been making on its No. 50 A selector. This selector has been put through over one and one-quarter million operations. This is equivalent to twenty-nine years of service, allowing ten calls per hour, twenty-four hours a day. The new semaphore which has recently been developed by the company will be in operation. This device combines a signal and telephone system and is sure to effect great operating economies in the handling of traffic. There will also be on exhibition transmitters and receivers, transmitter arms of various types, including the new Western Electric arm, desk stands, hand sets, jacks, plugs, keys, lightning arresters, protectors, condensers, retardation coils, line poles, blocking sets, test panels, battery boxes and line material. The new Western Electric group selector will be shown for the first time. The company will be represented by Messrs. G. K. Heyer, O. D. Street, E. A. Hawkins, J. L. McQuarrie, O. E. Stephens, R. F. Spamer, of the New York house; Mr. E. V. Adams, of the Chicago house, and Messrs. E. L. Hawkins, W. F. Abley and H. B. Gilmore, of the Boston house.

LETTERS FROM OUR AGENTS.

NEW YORK, POSTAL.

Mr. J. B. Havice has been appointed assistant chief operator days.

Mr. E. T. Ewing, day wire chief, has been transferred to a similar position on the night force, Mr. T. H. Tierney from the night force taking his place at the Eastern board.

NEW YORK, WESTERN UNION.

Mr. Martin Durivan, of this office, has resumed his position as chief operator at Long Branch, N. J.

Charles J. Lawson, aged 63 years, of this department, died suddenly on June 7. He was in the seventies night chief operator in the St. Louis office. He held many important positions in the telegraph service at other points and was attached to this office for the past thirty years, occupying the positions of operator, division chief, wire chief, etc.

Jacob Kline, who was employed as an operator in this office some years ago, died in Rochester, N. Y., June 6.

Milton Stephenson, formerly employed in this department, died at his home in Brooklyn, N. Y., on June 7. He will be remembered as a young man full of ambition and his manner endeared him to a host of friends. His father was the late R. G. Stephenson, who was general traffic chief in this office.

DALLAS, WESTERN UNION.

The Dallas office has grown rapidly in late years. We now occupy a large part of two floors in one of the principal buildings of Dallas and a large force of men is kept busy night and day handling the business.

Mr. W. B. Kendall, manager of the office, is a gentleman and highly efficient. His assistant is Mr. K. Stiles, who came from Chicago. The force is made up as follows: W. S. Strawbridge, chief operator; Roy Delay, night chief operator; H. P. Boni, wire chief; John B. Dillon, assistant wire chief; Al Lally, night wire chief; D. V. Snyder, repeater chief; J. J. McCormick, formerly of Chicago, repeater chief; David G. Lockwood, night repeater chief, succeeding Ora Downing, recently returned to Chicago; Gus Mansenerius, Aaron Roos, J. L. Laney, R. H. Loyd and B. H. Moody, traffic chiefs, and a large force of operators working under amicable relations with officials who are interested in the work and in the men employed to do the work.

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Mr. Laney is one of the oldest members of the force in point of service. His entire business career has been spent in the employ of the Western Union Company.

LOS ANGELES, WESTERN UNION.

Mr. T. W. Carroll, assistant to the general manager, New York, was a recent visitor at Los Angeles.

Two more stories have been added to the Western Union office building on Spring Street below Sixth. On the fifth floor a telephone switchboard has been installed to accommodate this branch of the business, pneumatic tubes running thence to the operating room.

PHILADELPHIA, POSTAL.

Messrs. C. P. Bruch, third vice-president, E. B. Pillsbury, general superintendent, and M. M. Davis, electrical engineer, of New York, and H. A. Tuttle, president of the North American Telegraph Company, Minneapolis, Minn., were recent visitors at this office.

Mr. L. L. Howell, supervisor of traffic, was here for several days looking over the traffic situation.

Mr. J. M. Eder spent several days in Atlantic City overhauling the quads there for use during the summer rush.

A new Keystone Telephone Exchange has been installed which will greatly increase our already rapid telephone delivery of messages.

The continued warm weather has caused the business to take a jump, especially in the Delaware, Maryland and Virginia produce district.

RICHMOND, VA., WESTERN UNION.

On June 2 eleven members of the Western Union operating department at Richmond, Va., met and organized the "Western Union Electrical Club of Richmond." Officers were elected and a systematic course of study was planned. The particular object of the club is to advance the educational attainments of its members from a technical standpoint, but other phases of the telegraph, such as traffic conditions, etc., will be discussed. At the second meeting fifteen members were present and it is expected that the membership will continue to grow. The meetings are held every Tuesday night. A great deal of interest has been manifested, the men showing by their attendance that they are willing and glad to have an opportunity to more thoroughly and fully study this phase of the telegraph business.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

TUCSON, WESTERN UNION.

Reconstruction of the Western Union circuits in and out of Tucson, Ariz., has been completed. All poles, wires and connections are now in first-class condition. The recent insurrecto activities along the Mexican border have more or less delayed business to Mexico.

The local office was recently inspected by assistant to the general manager, T. W. Carroll, of New York, and District Commercial Superintendent Hugh McPhee and District Plant Superintendent L. Messner of Los Angeles, who were well pleased with the up-to-date conditions and service found here. These officials visited the ancient San Xavier Mission near Tucson while in the city.

Martin's Double Lever **VIBROPLEX,** $8.00 f. o. b. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

FOR SALE—A Bunnell galvanometer, complete in leather case, with resistance coils and connections for Wheatstone bridge measurements. Must be disposed of immediately to close an estate. Cost over $100.00. Will sell for $35.00. Address "Galvanometer," care Telegraph and Telephone Age, New York.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, enables telegraph and telephone employes to provide for their families life insurance in reasonable amounts, at a cost so low as to be within the reach of all. It has already paid beneficiaries of deceased members $1,500,000, at an average annual cost per $1,000 of about four cents a day, and has also accumulated $327,000 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.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 13. NEW YORK, JULY 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

THE FIRST DYNAMO.

Probably the best way to obtain a thorough knowledge of the construction and the principles involved in the operation of any finished industrial device is to go back and follow the inventor throughout his first experiments.

By this method one not only gets the true idea of the conception, purpose, and basic principles which govern the construction of the modern machine, but the facts are so impressed on the mind by the things that happened or did not happen when such experiments were made that they are never forgotten.

For example, let us take a dynamo. The student is told that a dynamo generates electricity by the rotation of a coil of wire in a magnetic field in such a manner that the wires of the coil cut the magnetic lines of force and the faster they cut the lines per second or the greater number cut per revolution, the greater is the E. M. F. developed. Of course, the student admits the facts, as he can readily see that such is the case. Yet after all it is only an assertion so far as he is concerned. He does not quite understand why, and for that reason must turn to his textboook and reread the definition several times before he can remember it. In other words, the logic of it has not been impressed on his mind.

If now he will go back and follow Faraday during his experimental days, note how he happened to think of developing electricity by mechanical means, and particularly note the failures he made before finally solving the problem, he will see the reason for every particular point of design or construction of a modern machine. Nor will he ever have to refer to the textbook again for the definition. Each feature of the machine will remind the student of "first principles."

Now let us go back to about the year 1830. At that time Oersted had made what was then considered one of the greatest discoveries in electricity, viz.: that magnetism could be created by

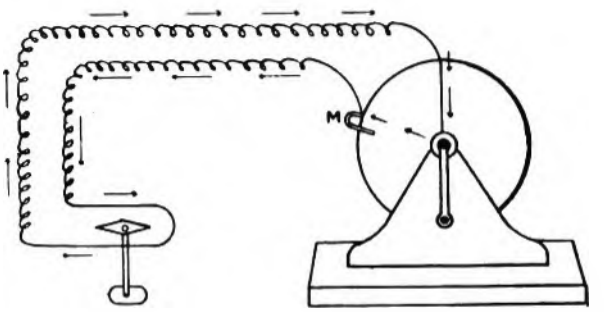

DIAGRAM OF THE FIRST DYNAMO.

an electric current. It was not long after this discovery that one or two scientists had thought it just possible that the tables might be turned, and a current created by magnetism. But no one had succeeded in bringing about that result. Faraday in 1831 after many tedious experiments finally succeeded and the crude machine he constructed, which is roughly shown in the accompanying illustration, constituted the first dynamo that was ever built. Before describing it let us follow Faraday's first experiments.

He knew to begin with that magnetism and an electric current were inseparable companions; therefore he concluded that if he placed a second wire in the magnetic field surrounding the first wire which carried a current, he should be able to detect a secondary current in wire No. 2. In this conclusion he was correct, but he had a hard time in proving it. Every now and then he would get a spasmodic deflection of the galvanometer needle placed in wire No. 2, but it immediately dropped to zero and thus constantly baffled his efforts. He now had proof that current did actually develop in the secondary circuit, but as yet did not know how or why. Finally after many ex-

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periments he noticed that these deflections never occurred except just at the moment he made the connections or disconnected them. The trouble was he at first did not look at the needle until he had made all the connections, when of course it was too late.

As soon as he learned that the current in wire No. 2 flowed only at the instant of "make" and again at "break," he was as puzzled about the action as ever.

After pondering over the phenomenon a long time he remembered that a current of electricity in a wire requires a certain fraction of time to rise to its full volume, and also to fall to zero, and hence concluded that the magnetism may have developed and receded in step with it. From this he got the idea that the alterations in the strength of the magnetic field, which naturally occurred only at the moment of "make" and "break," were the real cause of the secondary current, and that it also explained why no current flowed in the secondary after the current in wire No. 1 was fully established.

To verify these conclusions he then took an ordinary permanent steel magnet, in no way connected with an electric current, and placed his coil, or wire No. 2 containing the galvanometer, near the polepieces, or in other words in the magnet's own field. It required only a few minutes to learn, what we all now know to be a fact, that current will flow in the coil as long as the coil is kept moving either to or from the polepieces of the magnet, but will not flow if you stop. Everything was now plain sailing. He saw that the current was due to continued alterations occurring in the number of magnetic lines of force flowing through the coil because he knew that the density of the lines in the magnetic field was different at any two points between which the coil might be moved. He also noted that it required mechanical energy to move the coil back and forward, although in this case he used his hand. Thus he obtained the first idea of constructing a machine that would convert mechanical energy into electrical energy and at the same time proved to the world that magnetism could also be made to produce an electric current.

A glance at the illustration will show the manner in which the "baby dynamo," as it was called, was constructed and operated.

Between the polepieces of a strong steel magnet he rotated a large copper disc by means of a crank after the manner of an ordinary grindstone. Two brushes were attached to this disc, one pressed on the axis and the other on the circumference, while a galvanometer was connected in circuit, the terminals of which were connected with the two brushes as shown.

When the disc was rotated rapidly it cut through the lines of force and the resulting E. M. F. developed at that point caused a current of electricity to travel across the circumference to the other brush where it was carried off to the galvanometer via the wire connected to the companion brush.

Of course this machine developed a very feeble current, but it contained all the principles employed in modern machines, viz.: the magnetic field, the rotating armature, the two brushes, and means of rotating the armature.

Modern machines furnish a stronger magnetic field, because they are electro-magnets energized by electric currents. The armatures create more E. M. F. because coils of low resistance replace the copper disc and can be rotated faster and in a much stronger field.

The student should study the "baby dynamo" carefully and then compare each part thereof with the corresponding parts in the modern machine. Note the difference in the construction and ask "why."

Recent Telegraph and Telephone Patents.

ISSUED JUNE 6.

994,302. Telephone System. To H. P. Clausen, Chicago, Ill.

994,361. Method of Propagating Telephonic Currents. To C. G. Ashley, Chicago, Ill.

994,371. Individual Selective Lock-Out Device for Party-Line Telephone Systems. To W. M. Bruce, Jr., Springfield, Ohio.

994,426. Receiver for Wireless Telegraphy. To R. H. Rendahl, Berlin, Germany.

994,500. Selective System for Party-Line Telephones. To. W. M. Bruce, Jr., Springfield, Ohio.

ISSUED JUNE 13.

994,719. Telephone System. To H. P. Clausen, Chicago, Ill.

995,339. Space Telegraphy. To L. De Forest, New York.

Personal.

Mrs. L. J. Brant, wife of the late John Brant, secretary of the Old Time Telegraphers' and Historical Association, New York, will spend the summer months with friends in New York State.

Miss Camille Carvin Sheppard, daughter of Mr. W. A. Sheppard, manager of the Western Union office at Montgomery, Ala., was married to Mr. Oscar Brannen Ogletree on June 28.

Mr. Will Y. Ellett superintendent of fire alarm telegraph, Elmira, N. Y., was a recent New York visitor and took occasion to call on many of his New York friends while in the city.

Mr. A. Phillip, an official of the Poulsen Wireless Telegraph and Telephone Company, Copenhagen, Denmark, was in San Francisco recently in connection with the extension of his company's service.

Mr. P. W. Drew, superintendent of telegraph of the Minneapolis, St. Paul & Sault Ste. Marie Railway, Chicago, and secretary of the Association of Railway Telegraph Superintendents, was a recent New York visitor. He was accompanied by Mrs. Drew.

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Miss Julia Sullivan, a telegraph operator at Great Barrington, Mass., attended the coronation of King George and Queen Mary of England on June 22, as a guest of one of her Massachusetts friends.

George Maynard, son of Mr. G. C. Maynard, of Washington, D. C., a well-known forty-niner of the telegraph, was awarded the prize for excellence in spelling at the recent commencement excercises of Cheshire School, Cheshire, Conn. He was also awarded honorable mention for general scholarship.

Mr. Fred. Allen, formerly an operator for the Postal Telegraph-Cable Company at Washington, D. C., and late of the Waldorf-Astoria Hotel, New York, has accepted the position of assistant manager of the Hotel Marie Antoinette, New York. Mr. Allen is a son of Mr. W. H. Allen, former manager of the Postal office at Washington, D. C., and now private secretary to Fourth Assistant Postmaster-General P. V. DeGraw.

Mr. Frank C. Mason, formerly superintendent of police telegraph, Brooklyn, N. Y., entertained a class from the Arcanum Club at his country home, Glen Alex Farm, Washington Mills, N. Y., recently. A lunch was served and games were indulged in. Mr. F. E. Howell, manager of the Western Union Telegraph office at Utica, N. Y., won the first prize for broad jumping and Messrs. McIntyre and Wells, former operators, participated in the quoits contest. The prizes were donated by Mr. Mason.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Theo. L. Cuyler, Jr., assistant treasurer of this company, is enjoying a well-earned vacation in Connecticut.

Mr. C. H. Walters, assistant cashier of the New York office has been appointed division cashier, and Mr. W. V. Stahl has been promoted from the auditor's office to succeed Mr. Walters as assistant cashier.

Mr. C. E. Bagley, district superintendent, Philadelphia, Pa., was a recent executive office visitor.

Mr. H. Scrivens, district superintendent, Pittsburg, Pa., is spending a vacation at Chautauqua, N. Y. During his absence Mr. Leona Lemon, division superintendent, New York is looking after affairs in Mr. Scrivens' district.

Mr. A. B. Parrish, division cashier, New York, has been transferred to the general manager's office.

Mr. Charles M. Wilgus has been appointed manager of the Galveston, Tex., office of the Postal Telegraph Company of Texas, vice Fred. A. Rollfing.

Mr. Frank S. Gould, manager of the Postal office at Grand Rapids, Mich., has been advanced to the managership of the Detroit office of the same company, vice B. F. Ramsdell, transferred to Chicago.

Mr. J. F. Heard, electrical inspector of this company, Atlanta, Ga., and Mr. F. N. Andrews of the Birmingham, Ala., office were recent New York business visitors. Both gentlemen called on numerous friends while in this city. Mr. Andrews is an old New Yorker, having been employed in this city in the eighties. He has been a resident of Birmingham for the past eighteen years.

The Mackay Telegraph and Cable Company opened its Dallas, Tex., office June 22.

The Postal Telegraph Cable Company has leased considerable additional space on the eleventh floor of its building in Chicago, to better meet the needs of the increasing business.

Mr. Frank S. Gould, manager of the Detroit, Mich., office of the Postal Telegraph-Cable Company, was born in Philadelphia, Jefferson Co., N. Y., October 3, 1870, and entered the telegraph service at Grand Rapids, Mich., June 1, 1887. For several years afterwards he worked as operator on various railroads in the Northwest. His commercial service began with the Western Union Company at Lacrosse, Wis., afterwards going to Fargo, N. D. Later he went to Duluth for the North American Telegraph Company and afterwards with the United Press and the Associated Press. On April 1, 1900, he became manager of the Grand Rapids, Mich., office of the Postal Telegraph-Cable Company, which position he held at the time of his appointment to the managership of the Detroit office.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. E. J. Hall, chairman of the executive committee of this company, is spending the summer in cruising around the waters about New York in his schooner yacht *Latona*.

Mr. Belvidere Brooks, general manager, attended the commencement exercises at Williams College, Williamstown, Mass., from which his son Bruce has just graduated.

Mr. Wm. H. Baker, vice-president of the American District Telegraph Company of New Jersey, is enjoying a short vacation for the benefit of his health.

Mr. T. W. Carroll, assistant to the general manager, has returned from his inspection trip to the Pacific Coast after an absence of six weeks.

Mr. A. G. Saylor, general superintendent, New York, has returned from a trip to Philadelphia and Washington.

Mr. E. M. Mulford, division commercial superintendent, New York, spent a few days recently in Pittsburg on company business.

Mr. George M. Yorke, engineer of the company has established his office in the room adjoining that of Mr. W. N. Fashbaugh, traffic engineer, on the fourth floor.

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Mr. Charles B. Dunham manager of the Canso, N. S., office of the Western Union Telegraph Company, has been transferred to the Bay Roberts, N. F., station of the same company. In August this year Mr. Dunham will have been in the employ of the company for half a century. He entered the service of the old American Telegraph Company at St. John, N. B., as messenger in August, 1861, and became an operator in 1863. He was appointed manager of the Canso cable station in March, 1882, and has been there ever since until his transfer to Bay Roberts.

Mr. T. C. Harlan, has been appointed manager of the Western Union Telegraph office, at Lake Geneva, Wis.

Mr. Chas. M. Holmes, who has just been appointed manager of the Western Union Telegraph Company at Jacksonville, Fla., was born in Monroe, Wis., in 1860. He first entered the telegraph service as a messenger at Atlanta, Ga., in 1871, having studied telegraphy during school vacation. He graduated from school at the age of fourteen years and went to Wisconsin where he entered the railroad service. In 1883 he went to Kansas City, Mo., and afterward entered the employ of the Postal Telegraph-Cable Company which was then building its lines through that part of the country. Two years later he became connected with the Atchison, Topeka and Santa Fe Railroad, becoming finally the head of a department in the auditor's office at Los Angeles, Cal. Later he was train dispatcher of the Southern Pacific Railroad and in 1900 entered the Western Union service, becoming manager at Bakersfield and Sacramento, Cal., and Bisbee, Ariz., successively. He was afterwards employed in the Salt Lake City office and from there was transferred to Jacksonville, Fla., in January this year. He was appointed district commercial manager for Florida and Alabama and on May 15, received the appointment of manager at Jacksonville. During his busy career Mr. Holmes has found time to study law and is a graduate of a law college, holding the degree of B. L. He is a member of the Old Time Telegraphers' Association.

Mr. A. B. Robinson, night chief operator of the Western Union office at Wilmington, N. C., has been promoted to the managership of the Charlottesville, Va., office of the same company.

Morse Electric Club Outing.—The summer outing of the Morse Electric Club will be held at Donnelly's Boulevard Hotel, College Point, L. I., N. Y., Saturday, July 8. 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. There will be an attractive and enjoyable entertainment programme. Athletic events and a game of baseball will be features of the occasion. Tickets can be obtained of Mr. R. J. Murphy, treasurer, 195 Broadway, New York, at $1.50 each.

Conference of Pittsburg District Commercial Managers and Managers.

A conference of district commercial managers and managers of the third district, Eastern Division, Western Union Telegraph Company, was held at the Fort Pitt Hotel, Pittsburg, Pa., June 22. At the meeting papers were read as follows: "Co-operation," by G. F. Stadtmiller, district commercial manager; "The Company's Relations to the Public," by E. R. Collins, district commercial manager; "Courtesy," by G. S. Walters, district commercial manager; "The Value of Organized Messenger Service," by Earl Burton, district supervisor of messenger service; "What Efficient Traffic Means to the Commercial Department," by N. E. Church, commercial superintendent; "Systematic Solicitation," by S. C. Moran, solicitor; "Explanation of Form 219-A," by C. E. Furick, cashier. The two sessions were presided over by Mr. A. C. Terry, district commercial superintendent, Pittsburg.

There were thirty-five district commercial managers and managers present. Mr. E. M. Mulford, division commercial superintendent, Mr. J. A. Hill, division superintendent of traffic, and Mr. A. C. Kaufman, commercial agent, all of New York, were also in attendance. Much interest was manifested in the papers read and they were attentively listened to.

In the evening a dinner was served at the Fort Pitt Hotel at which there were thirty-three seated at the tables. After the dinner appropriate remarks were made by Messrs. E. M. Mulford, J. A. Hill, A. C. Kaufman and A. C. Terry, who presided.

An interesting feature of the afternoon session was the effort made by Solicitor S. C. Moran, of the Pittsburg office, to induce Mr. Terry, who assumed the rôle of principal in an important firm of commission merchants, and his chief clerk, (Mr. Kaufman), to give their telegraph business to the Western Union Telegraph Company. The dialogue between these three continued for nearly an hour to the interest and amusement of the managers present.

District Commercial Superintendent Terry has decided to hold tri-annual conferences at which all district commercial managers and managers will be in attendance. He will also confer with the five district commercial managers at Pittsburg monthly.

Those present were: Mr. E. M. Mulford, division commercial superintendent; Mr. J. A. Hill, division superintendent of traffic; Mr. A. C. Kaufman, commercial agent, New York.

District commercial managers: V. E. Church, E. R. Collens, Pittsburg; G. S. Walters, Clarkesburg, W. Va.; G. F. Stadtmiller, Jamestown, N. Y.; H. King, Charlestown, W. Va.

Managers: H. Young, Wheeling, W. Va.; I. N. Sharpnack, Parkersburg, W. Va.; C. H. Reed, Huntington, W. Va.; J. W. Barbee, Charlestown, W. Va.; U. W. Boggess, Clarkesburg, W. Va.;

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M. N. Haller, Elkins, W. Va.; W. T. McWhorter, Fairmont, W. Va.; S. W. Kirk, Johnstown, Pa.; J. L. Snyder, Cumberland, Md.; H. Trent, Bluefield, W. Va.; J. F. Callahan, New Castle, Pa.; J. C. McGrew, Erie, Pa.; M. F. Horne, New Kensington, Pa.; L. J. Ward, Pittsburg, Pa.; T. J. Jones, Pittsburg, Pa.; G. F. Harris, Ridgway, Pa.; F. W. Clark, Sharon, Pa.; E. E. Buel, Bradford, Pa.; Jos. W. Barbee, Butler, Pa.; A. A. Jeunet, Franklin, Pa.

Solicitors: S. C. Moran, Pittsburg; Geo. Blair, Pittsburg; J. A. Javens, Pittsburg.

Municipal Electricians.

Mr. William B. Martin, assistant superintendent of the Albany, N. Y., fire alarm bureau, has been promoted to be superintendent.

Automatic Fire Alarm.—Mr. H. Becker, of Newport, Ky., has been granted a patent on an automatic fire alarm.

Thermostat Patents.—Mr. M. J. Briggs, of Philadelphia, Pa., has been granted two patents (Nos. 992,541 and 992,542) on a thermostat.

Break-Glass Fire Alarm.—A patent has been issued to C. Auth, New York, on a break-glass fire alarm.

Fire Alarm Extensions at Richmond.—New fire alarm boxes and police telegraph signal equipment have been installed in Richmond, Va., under the supervision of Superintendent Wm. H. Thompson.

Fire and Burglar Alarms.—Patents have been issued to H. G. Perkins and G. H. Elliott, of Topeka, Kan., on a fire alarm; to J. M. Johnson, of Belleville, Kan., on a burglar and fire alarm system, and to J. W. Mobray, of Gleichen, Alberta, Can., on a thermal electric fire alarm.

Fire Alarm System in Kansas City.—The 173 police call boxes in Kansas City, Mo., have been fitted with fire alarm devices and it is now possible for a policeman or pedestrian upon the discovery of a fire to send in an alarm without hunting up a telephone. One hundred more street poles will be fitted out with police and fire alarm boxes. Ultimately it is intended to install red electric globes on each pole, to be flashed when the police stations wish to communicate with the policeman on the beat.

Canadian Notes.

Mr. A. E. Starr has been appointed acting manager of the Victoria, B. C., office of the Canadian Pacific Railway Company's Telegraphs, vice Mr. William Christie granted an extended leave of absence. Mr. Christie is one of the best known of old timers and before his entering the Canadian Pacific service some twenty years ago was well known in telegraph circles in the United States. He entered the service of the Dominion Telegraph Company in 1880 and soon became an operator. He was in Texas for the benefit of his health between 1882 and 1884 and in December of the latter year he returned to Victoria, becoming manager of the office in 1891.

Racing News Stopped in Montreal.—The Montreal police authorities recently cut the wires between the Bluebonnet race track and the city, thus preventing the sending of the results of the races to newspapers. It is alleged that the pool rooms were getting the benefit of the newspaper information.

The Railroad.

Train Dispatchers Convention.—The twenty-fourth annual convention of the Train Dispatchers Association of North America was held in Baltimore, Md., June 20. There was a large attendance of members from the United States, Canada and Mexico.

Telephone Train Dispatching in Oregon.—The Oregon-Washington Railroad and Navigation Company has ordered of the Western Electric Company telephone train dispatching equipment for a circuit from Portland, Ore., to The Dalles, Ore., a distance of ninety miles. This circuit will be equipped with seventeen stations.

Telephone Train Dispatching on the Pennsylvania.—The telephone system of train dispatching is used on 2,530 miles of track, both single and double, on the Pennsylvania Railroad. At present the company has under construction 293 miles. The total mileage of the road is 5,558. Mr. J. C. Johnson, Philadelphia, Pa., is superintendent of telegraph. This information was received too late to be included in the statistical table published in our issue of June 16.

Meeting of Railway Signal Association.—The Railway Signal Association met at the Astor Hotel, New York, June 13 and 14. A letter was read by secretary C. C. Rosenberg regarding the fund for the proposed monument at Turner, N. Y., to commemorate the first telegraphic train order. The various committees of the association made reports, and trips of inspections were made to the different railroad yards in the city. A paper on Apparatus for charging storage batteries was read and discussed.

The Telephone.

Mr. A. R. Skinker of the traffic department of the American Telephone and Telegraph Company, New, York, has been appointed supervisor of traffic of the fourth division for the same company at Chicago, Ill.

Mr. W. D. Hanchette, formerly manager of the Western Union Telegraph Company at Watertown, N. Y., and now and for many years past identified with the telephone service at Albany, N. Y., is the author of an article in *The Telephone Review* for May entitled "The Introduction of the

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Telephone into the North Country—A Chronicle of the Early Days of Telephony in New York State." It is an interesting story and Mr. Hanchette was associated in this early work with Mr. W. B. Eddy who was then manager of the Whitehall, N. Y., office of the Western Union Telegraph Company and now manager of the commercial department of the New York Telephone Company at Albany, N. Y.

Telephone Conference in Texas.—Commercial managers of the Southwestern Telegraph and Telephone Company met in conference recently in Galveston, Tex. Among those present were Mr. H. J. Pettengill, president; Mr. J. E. Farnsworth, vice-president and general manager; Mr. P. K. Baker, general commercial superintendent, and a number of other officials. Representatives from various independent companies also attended the meeting.

Telephony in England and America.—Mr. T. F. Purves, one of the four officials of the British postoffice who recently investigated the telephone service in the United States, states that the service in the large towns of America is distinctly smarter than in England; and since his return "the local London service has seemed more irritatingly slow than it did before." The average delay before a trunk connection can be obtained in England is not much greater than in America, except between large cities, where the superiority of the American trunk service is indisputable, the trunk lines being far more numerous; at the same time, the cost of a trunk call is correspondingly greater there.

Telephone Language in England. — The language of the telephone in London is different to that in America. For instance, there the operators say the line is "engaged"; here we say it is "busy." The Englishman is not so impolite as to say "Hello!" when trying to get some one on the telephone. He says "Are you there?" He is, however, adopting the terser American expression. Toll lines are called "trunks" in England, and the public asks for trunks instead of "long distance" wires. Lines between two exchanges are called "junction wires," and when one desires to have the person at the other end hold the wire, he says, "Will you please hold on?"

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, in the ratio of one share of new for each five of old. Rights attach as of June 30 and expire August 31. The proceeds of this issue of capital stock will be mainly used to provide the associated companies of the Bell system outside of the State of New York with funds for current and ordinary construction and extension of plant, and will be represented in the treasury of the American Telephone and Telegraph Company by the share capital or the capital advance notes of such companies. A part will be used for extensions to the plant (long-distance service) of the American Telephone and Telegraph Company outside of the State of New York, and a part to maintain the cash balances now being drawn upon for all the above purposes.

Radio-Telegraphy.

Wireless in New Zealand.—The New Zealand government proposes to erect a high-power wireless telegraph station on the Tinakori Hills behind Wellington.

Wireless Distress Call on Lake Erie. — The steamer *Western States* was disabled on Lake Erie recently and wireless distress signals were sent out from the crippled boat. The steamer *City of Cleveland* received the signals and went to the rescue, taking aboard the 225 passengers from the *Western States*.

Receivers Appointed for United Wireless Company. — Messrs. Sidney Harris and Robert E. Dowling have been appointed by Supreme Court Justice Cohalan as receivers for the United Wireless Telegraph Company, New York, four of whose officials are under sentence for violating the United States postal laws.

Train Control by Wireless. — Hertzian waves have been applied to the operation of an automatic train stop and cab signal invented by Mr. Frank W. Prentice who has been conducting experiments with the system on the Canadian Pacific Railway near Toronto, Ont., during the past year. Mr. Prentice is now turning the apparatus over to the railway company.

Obituary.

Thomas F. Kennedy, aged 45 years, for several years operator at the Maritime Exchange, New York, died June 15.

Mrs. Joe Hansen, wife of the late Col. Joe Hansen of St. Louis, Mo., whose death at Hot Springs, Ark., was announced in our issue for June 16, died at St. Joseph, Mo., June 18, less than one month after the death of her husband.

The Late Thomas Langdon.—Thomas Langdon, a well-known telegrapher in the West and Northwest, whose death was announced in our issue of June 1, was a member of the Society of the United States Military Telegraph Corps. He was in the military telegraph service during the last year or two of the civil war. He had a wide acquaintance in the South and West and was connected with early railroad building in Minnesota after the war. For several years afterwards he filled positions in many of the more important Western Union offices in the South, West and Northwest.

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Death of William Richard Brixey.

We regret to note the death at Seymour, Conn., of Mr. W. R. Brixey, one of the leading manufacturers in the field of insulated wire and cables. He was born at Southampton, England, May 11, 1851, educated at a well known grammar school and then entered the British Mercantile Marine service commanding his own ship and visiting all the leading ports of the world. He came to this country in 1878, becoming at once an American citizen, and went into business with his brother-in-law, Mr. A. G. Day, a pioneer in the American rubber industry and the inventor of Kerite. In 1879 he married Miss Francis N. DeWolfe, daughter of Alva G. DeWolfe, a coworker of Mr. Day and also an inventor of some note. The Day plant was at Seymour, Conn., and there Mr. Brixey developed the business with remarkable energy and intelligence, mastering it in every detail and becoming general manager

THE LATE W. R. BRIXEY.

on the death of Mr. Day, and sole proprietor upon the death of his sister, Mrs. Day.

Mr. Brixey was not satisfied with the use of his cables in the telegraph and telephone field or with the early endorsement of such men as Morse, but pushed out into larger developments in other fields. Some of the most noteworthy of these included the supplying and laying of the Alaskan cable, the furnishing of the Panama zone cable, and the furnishing of the wires and cables for the Pennsylvania tunnel and terminal connecting the two shores of the Hudson and East Rivers.

In 1908 Mr. Brixey incorporated the business as a company and soon after retired, leaving it to the management of his eldest son, Mr, Richard D. Brixey, president of the Kerite Insulated Wire & Cable Company. Mr. Brixey left two other sons, Mr. Reginald W. Brixey, vice-president, and Mr. Austin D. Brixey, secretary of the company.

Mr. Brixey was quite active in public life, being a member of the American Institute of Electrical Engineers, and a member for many years of the Old Guard of New York City with the rank of captain. He was a member of the Brooklyn Club and a high degree Mason. At the time of the terrible subway explosion at Murray Hill, New York, in 1902, he was very seriously injured by glass blown into his room at the adjacent hotel. His wonderful constitution, however, pulled him through injuries of a most serious character, though these probably undermined his health, which had always been of the best.

Mr. Brixey's wife died in 1909 and he is survived only by the three sons named. Mr. Brixey was a man of sterling qualities and of unusual generosity. His death will be sincerely regretted by all who knew him.

Death of F. N. Bassett.

Frederic N. Bassett, for many years a prominent figure in telegraph and newspaper circles in New York, died at Washington, D. C., June 20. Deceased was born in Connecticut January 22, 1853, and began his telegraphic career in 1870 as an operator for the Western Union Company in New Haven, Conn. Two years later he came to New York and worked at 145 Broadway. In 1875 he accepted a position with the Associated Press at Washington and was one of the eight famous operators who manned the first leased wire of the Associated Press, between New York and Washington. He was appointed private secretary to Postmaster-General T. L. James in 1880, and on the retirement of Mr. James he became chief clerk of the post-office department. In 1883 he became post-office inspector, but returned to newspaper work in New York in 1887, afterward becoming general eastern manager of the United Press in New York and later of the combined United and Associated Press. After the failure of this concern in 1897 Mr. Bassett engaged in various lines of business, but in late years his health was not of the best.

QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. Having completely covered Mr. Jones' book we are now covering "The Quadruplex," by Maver and Davis, and will bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER IV.

How is the transmitter of a Stearns Duplex worked?

How is the relay wound?

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What are the resistance coils or rheostats used for?

What are the condensers used for in connection with a duplex?

Referring to Fig. 19, how does the current from battery F pass through the relay R?

With the connections as shown, what effect does the current from battery F produce upon the relay R?

What effect has the same current on relay R' at the other end of the line?

What is the effect of closing transmitter T', as shown in the illustration?

With the transmitter T' closed how are the currents divided between the coils of relay R'?

Describe what takes place if the transmitter be now opened?

On which relay does battery F have active effect?

Which battery operates relay R?

Why does a line wire act like a condenser?

What happens when the battery is cut off from the line and a path to ground is substituted?

What factors cause a variation in the line discharge?

What is the ordinary term used to indicate the line discharge?

What is the difference in the effects of discharges on short and long circuits?

What is the condenser used for?

How is it connected to the relay?

What is the effect upon the line discharge upon the condenser discharge?

Why are coils Q and Q' used, and what should be the value of their resistances?

CHAPTER V.

Referring to Figs. 8 and 9 how is the magnetic polarity of the iron bar determined?

What is the magnetic effect of charging the direction of winding of the coils on the bar?

What is the rule for determining the polarity of a bar magnet?

How does the current flow on the line when the wire is connected to the positive pole of the battery?

How does it flow when the wire is connected to the negative pole?

What would be the effect of placing to the line the positive poles of equal batteries at each end?

Study the effects of reversing the direction of current through the relay coils as shown in Figs. 22 and 23.

What is an electro-magnet?

Study the construction of the polar relay shown in Fig. 24.

Why is the permanent magnet curved as shown?

Why do the pole pieces of the electro-magnet of a polar relay face each other?

Would this relay work if the permanent magnet were removed, the other parts remaining unchanged?

Western Union Earnings.—The report of the Western Union Telegraph Company for the quarter ending June 30 shows a decrease in net profits of $335,000. President Theo. N. Vail stated that while the net earnings for the year would show a decrease the gross will be in excess of the previous year.

Wooden Leg as a Life Preserver.—Those unfortunates who are compelled to use wooden legs as a means of propulsion now have cause to rejoice thereat. It has been demonstrated that wooden legs make excellent life preservers under favorable conditions. An operator in the West, with a wooden leg, was in a row boat with four companions when the boat capsized and threw them into the water. The man with the wooden leg could not swim but his leg could float and it is due to this fact that his life was saved. His companions located his position amid the waves by the bobbing up and down of the wooden leg and went to his rescue.

Constantinople Telephone System.—Reference was made in a recent issue of this paper to the proposed introduction of the telephone in Constantinople by English engineers. A staff of engineers is now in Constantinople to make a telephonic survey of the city and to prepare plans and specifications for the system, which is to have an original capacity of 10,000 lines, and to be ready to start service in July, 1913. As no telephone service yet exists in Turkey, all modern facilities having been debarred by the ex-Sultan, there are no available data whereby to gauge the probable use of the service or the probable traffic which the system will be called upon to carry. The peculiar composition of the population of Constantinople, makes the business part of the engineering study one of much complexity. Three languages are current—Turkish, Greek and French—while many more are spoken, and the variety of local customs and practices is probably greater than in any other large city in the world. The Telephone Development Company, Ltd., has been formed for the purpose of carrying on the necessary work, pending the organization of the Ottoman Telephone Company, which will construct the plant and operate the service.

Handbooks for Artisans and Experimenters.—Spon & Chamberlain, New York, one of the oldest firms in the world publishing technical books, produce a series of practical hand books for amateurs and students who are interested in experimental work. The list shows a great variety of subjects covered by these books, not only in the electrical line but in mechanics as well, and the price per copy is low enough to permit any one of limited means to acquire a general understanding of the practical construction of electrical and mechanical apparatus. The list of publications is a long and interesting one and the firm will send descriptive lists free to any one interested.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

July 1, 1911.

The Boston Convention of Railway Telegraph Superintendents.

The Boston Convention of the Association of Railway Telegraph Superintendents this week was a highly successful one from every point of view. The papers presented were on the whole of extraordinary quality and the discussions ensuing brought out much valuable information on subjects of direct and related interest.

One thing noticeable at the meeting of this association is the intense interest shown by the members in matters that are in the line of improvement in railway operation, and the eagerness with which they seize upon anything of promise shows that they are progressive and alive to the interests they represent.

Telephone train dispatching naturally received considerable attention and much information of value to all concerned was developed in the discussions on this important subject. It is not many years ago that the members shook their heads doubtfully at the suggestion that the telephone could be used for train dispatching; now, there is not one who does not shake his head the other way. This simply emphasizes the care that should be exercised in judging or forming opinions on matters that we or others have not submitted to a practical test. No man's opinion is worth anything if not supported by facts.

Can New Telegraph Business Be Created?

The experience with the day and night letter service has brought to light some interesting facts. It has proved among other things how sensitive the telegraph business is and how readily it adjusts itself to changed conditions. When the night letter service was introduced the cheaper rates had the effect of robbing the day service of some business, thus, to some extent nullifying the object intended, i. e., to keep the wires utilized during dull periods. As much of the business that was usually transacted during the day time was, under the new order of things, deferred to the night service by reason of the lower rates, it left a gap in the day business that had to be filled in.

This condition gave rise to the day letter service and how successfully the latter has accomplished its purpose has not yet been announced by the company conducting it. The object of the company is evidently to keep its plant in use as many of the twenty-four hours per day as possible. This, of course, is a correct principle, but in order to attain this end there should be business enough to keep the lines busy. But, it has been argued, there is not enough traffic to do this. Granting this, the only thing to do is to create new business and this seems to be the task that the company has undertaken. How far it will succeed no one yet knows. Opinion seems to be sharply divided on that point. On the one hand it is asserted that the general public cannot be induced to use the telegraph any more than it does now, while on the other it is claimed that considerable new business has actually been created. The company's agents are making an active campaign and are said to be meeting with much success in interesting the general public in the telegraph and thus creating new traffic. No doubt there are thousands of persons who could be secured as new or more liberal patrons of the telegraph were its advantages pointed out to them in a proper manner. This part of the service requires very skilfull and intelligent handling, however, and the company must be prepared to render first-class service and thus please the new customers in order to retain their business.

Viewed in whatever light, the problems confronting the telegraph company are highly interesting and the results are being watched with the deepest interest.

How to Use the Telephone.

That the telephone is an instrument of great utility is generally conceded but it is questionable whether an instrument of any kind in general use is so much misused. Perhaps not one person in three speaks into the transmitter properly and it is surprising that the telephone works as well as it does under such adverse circumstances. Many people seem to have the idea that if the mouthpiece of the transmitter is pointed towards them that it is all that is necessary for proper transmission, the question of proximity of the lips to the mouthpiece being unthought of.

We have heard of instances where telephones have been ordered discontinued and removed by irate subscribers on the ground that they would not work, and on proper investigation by the company's inspectors it was found that the fault lay wholly with the subscribers in not knowing how to talk into the transmitter.

In railroad telephone work such misuse of the instrument is so common as to require special in-

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structions by some railroad companies for its correction. In the excellent article published in our issue of June 16 on "Current Practice in Rules for Telephone Train Dispatching," the author, Mr. John W. Barney, refers incidentally to this matter and calls attention to the importance of speaking into the mouthpiece in a proper manner. The advice given there should be carefully followed on all railroads because it concerns a matter of vital importance, involving, as it does, the safety of the lives of passengers.

Popularizing the Telegraph in Belgium.

The Belgium postal authorities have inaugurated for internal communication a system of telegraphic subscriptions, by means of which newspapers, business houses and any persons who, while making daily use of the telegraph, do not wish to rent a private wire, are enabled to transmit their messages at about one-half of the ordinary rates. The only conditions attached to the system, which Belgium is said to be the first country to adopt, are that a minimum number of 250 words per day shall be paid for, and that the messages shall be transmitted between stated hours. The Belgium government is now desirous of obtaining the consent of Great Britain, France and Germany, in order that a similar system may be established between Belgium and those countries.

Proposed Telegraph Tournament for 1912.

The advisability of holding a telegraph tournament in the southern states in 1912 has been suggested. The last tournament held in that section was Atlanta, Ga., on March 1, 1902, and was participated in by many of the most expert operators in the United States. Contestants came from Chicago, St. Louis, Denver, San Francisco, Kansas City, New York, Washington, Philadelphia, and many southern points.

About $2,000 in money prizes was distributed, as well as prizes from typewriter companies, and Mr. Andrew Carnegie gave a handsome gold medal studded with a large diamond valued at about $500 to be awarded to the best all around telegrapher. This it will be remembered was won by Mr. Fred. M. McClintic and later lost to Mr. Wm. M. Gibson of New York, the present holder. Mr. Carnegie provided that the medal should be contested for from time to time and passed to the winner.

It is nearly ten years since the Atlanta tournament took place and it has been suggested to us by Mr. H. Van Devender, commercial superintendent of the Western Union Telegraph Company at New Orleans, La., that that city would be a good place for the meeting of the next tournament. He thinks that some time in February, 1912, just before the Mardi Gras festival in New Orleans, would be an advantageous time. Railroad fares on all lines to that city will then be reduced on account of the festival and this would likely ensure a large representation from the various sections of the country.

New Orleans is suggested on account of the advantages to be obtained at this time, but there are other southern cities that might be considered as equally available for the contest, including Dallas, Tex., Memphis, Tenn., Atlanta, Ga., Nashville, Tenn., etc., and no doubt any one of them would be willing to undertake the responsibility attaching to such an enterprise.

It is hoped that sufficient enthusiasm will be aroused to ensure another contest of skill in the near future.

The Delights of a Shipwreck.

Mr. Reid G. Ford, the wireless operator on Mr. E. C. Benedict's yacht *Virginia* which went ashore near Havana recently states that it was "the most delightful wreck I have ever known or read about."

He thus describes the "delights" of the wreck:

"We were," said he, "grounded at a spot where the coral bottom could be seen through the clear, still water. Fishes of all colors swam all around us. Most of the morning was spent by those on board in fishing.

"At midday the *Virginia Daily Telegram* was issued. This was my work. The news was made up of little incidents of the day and all we picked up by wireless. A good deal of this was about ourselves and the plight of the vessel.

"In the evenings we had concerts, at which Prof. Henry Rowe Shelley performed.

"The weather seemed made to order, and everybody had a good time until they were taken to Havana by the wrecking steamer a week after the wreck occurred."

Mr. Ford's experience was certainly a delightful one but it should not be assumed by inexperienced wireless mariners that the lot of wireless operators on ships is cast in such pleasant places.

A Thorn in the Western Union Flesh.—Because a woman in New York thought she was unjustly charged 15 cents for the delivery of a telegram by the Western Union Telegraph Company, she complained to the Public Service Commission and the company has been requested to answer the charge. The company's lawyers will be compelled to go to Albany to explain matters. It costs money sometimes to defend a principle, and in this case the telegraph company will be obliged to go to a considerable expense on account of a wrathy woman, who insists that she has a claim of 15 cents damages against that corporation.

Control of Public Utilities in District of Columbia.—A bill has been introduced in the Senate at Washington providing for a public utilities commission for the District of Columbia. The bill gives the commission full powers to supervise and regulate the operation of all public utilities in the District, including telegraph and telephone companies.

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Mr. Tesla's 1,000,000 Horsepower Wireless Telephone.

In a lecture before the New York Section of the National Electric Light Association, New York, on May 15, Mr. Nikola Tesla, the noted inventor, told of many things he expected to do by the use of wireless electrical power.

"I have annihilated distance in my scheme," he said, "and when perfected it will not be one mite different than my present plans call for. The air will be my medium, and I will be able to transmit energy of any amount to any place in the world. I will also be able to send messages to all parts of the world, and I will send words out into the world which will come out of the ground in the Sahara Desert with such force that they can be heard for fifteen miles around.

"I also hope to set up a central wireless telephone station whereby there will be a force of 1,000,000-horse power behind each word uttered into my instrument, and in which distance will play no hindrances whatever. Many hundreds of people will be able to talk at the same time and without any interference with each other."

Mr. Tesla says he has perfected a new steam engine for aeroplanes. A ten horse-power engine will weigh one pound.

Wireless Operator's Pocketbook of Information.

The Wireless Operator's Pocketbook of Information and Diagrams, is the title of a 174-page book just off the press. 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, $1.25 or $1.50, according to the style of binding, which is in cloth, leatherette and leather, respectively. 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.

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

Public Service in Florida.—A bill has been introduced in the Florida Senate to extend the powers of the railroad commission so as to give it authority to regulate charges of telegraph companies in that state.

Forgery of Money Transfers.—Four men were recently indicted in Washington, D. C., on charges of forgery and conspiracy growing out of the securing of $465 from the Western Union Telegraph Company on alleged bogus money transfer telegrams.

A Youthful Wireless Inventor.—W. E. D. Stokes, Jr., of New York, 12 years of age and a wireless amateur, has, it is stated, invented a "receiving box" by which he reproduces the words and sounds in a wireless telephone loud enough to be heard several feet from the instrument.

Wire Thieves.—The Postal Telegraph-Cable Company has suffered the loss of considerable copper wire recently in the vicinity of Chicago. In one instance three miles of wire was carried off. The Western Union Company and the Chicago Telephone Company have also sustained considerable loss of wire.

Decision Against Loan Sharks.—The war against money lenders on salaries is being prosecuted vigorously. The Appellate division of the Supreme Court at New York has decided that no money may be collected from the employer of a salaried borrower unless notice is given to the employer at the time the money is advanced.

Telephone Rates in Pennsylvania.—The Pennsylvania State Railroad Commission, in passing upon a case involving telephone rates, decided that the practice of the respondent in giving certain periods of free telephone service in consideration of contracts for a longer period of service at the standard rates, is illegal and unlawfully discriminatory, and it is, therefore, recommended that said practice be forthwith discontinued and abandoned.

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What is Thought of Telegraph and Telephone Age.

Mr. E. A. Chenery, superintendent of telegraph, Missouri Pacific Railroad, St. Louis, Mo., writes: "The Age is read with much regularity and oftimes with greater pleasure than some of my mail, and is essentially necessary."

Mr. S. B. McMichael, superintendent of the Dominion Messenger and Signal Company, Toronto, Ont., writes: "You did quite right in renewing my subscription, as I would not care to have your valuable paper discontinued under any circumstances."

Mr. W. T. Capen, general superintendent of plant of the Postal Telegraph-Cable Company, New York, in renewing his subscription for another year, writes: "Enclosed please find my check for the purpose of renewing my subscription to my old friend 'Age,' which is the most welcome periodical I receive."

Mr. E. Boening, district commercial superintendent of the Western Union Telegraph Company, Seattle, Wash., writes: "Your action in renewing my subscription for the TELEGRAPH AND TELEPHONE AGE meets with my hearty approval. I take pleasure in enclosing check for $2.00 covering the same."

Mr. E. J. Little, superintendent of telegraph of the Great Northern Railway Company, St. Paul, Minn., in renewing his subscription for another year, writes: "I will be very glad to have you renew my subscription each year, as I consider the Age one of the most complete telegraph and telephone journals published."

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line Railway, Portsmouth, Va., writes: "I thank you very much for having renewed my subscription. Please understand, I wish this done as long as I am able to pay for it. We could not very well get along without the AGE."

Mr. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line, Wilmington, N. C., writes: "To say that the TELEGRAPH AND TELEPHONE AGE is indispensable would be trite and to say that I look forward to its arrival with eagerness, would be to repeat what many others have told you; but, as between lovers, the old story is new, I pass it on you."

An old friend of TELEGRAPH AND TELEPHONE AGE in renewing his subscription writes: "Your wrapper said my subscription expired. That is not so. It expires when I do and not before. Never saw perpetual motion, eh? Listen. My subscription is that same thing. The Age and I are pals. Don't interfere with the perpetuity. Keep it coming and draw on me for the annual dues."

Mr. A. W. Orton, an old-time and military telegrapher, now in the lumber business at Rome, N. Y., writes: "I always take pleasure in recommending the Age to those who are now connected with the telegraph or telephone work, for if one whose interest is in other lines of business finds something that is of value and interest in every number, certainly the employe who wishes to keep abreast with the advances in electricity ought to get great value from the knowledge to be derived from Telegraph and Telephone Age."

Mr. M. H. H. Duvall, of the firm of Goodwin, Duvall & Co., brokers, Augusta, Ga., in renewing his subscription, says: "Of course your action in renewing my subscription meets with my approval as well as my thanks. Telegraph and Telephone Age is always a welcome visitor to my office. I believe all of the old timers are interested in matters pertaining to the service in which many of us spent the best years of our lives and your paper affords the best medium of keeping us in touch on such matters as well as with many dear friends of former days."

Mr. W. C. Burton, civil service commissioner at Brooklyn, N. Y., and a former well-known telegrapher, in renewing his subscription for another year, writes: "I take pleasure in sending you herewith a renewal of my subscription to TELEGRAPH AND TELEPHONE AGE. The paper is a welcome visitor and commands my prompt attention and eager interest. It keeps me informed concerning the wonderful present-day development of telegraph and telephone, and gladdens my heart by its frequent announcement of the advancement of old friends and of the introduction of new and broader policies for the improvement of the lot of the rank and file."

New 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.

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Multum in Parvo.

BY J. S. KNAPP, BUFFALO, N. Y.

Apropos of the many and various improvements being inaugurated by the telegraph companies, not only for the benefit of the public service but also for the welfare of the employes, I deem it proper at this time to express some thoughts that have come to me in the direction of progress. "Many trifles make perfection, and perfection is no trifle," is the one principle that should govern the telegraph business.

All telegraph blanks for received messages should be of the size of the Western Union Company's form 2138, which measures 7 x 8 inches. The size will not inconvenience the public and will avoid the delay in traffic while an operator is securing a "long" blank on which to copy a 75 or 100-word telegram. Frequently an operator is required to use one or more of the smaller blanks fastened together to accomplish what could be done more easily by using the 7 x 8 blank.

The same blank should be used for relay messages and city messages. It is annoying and useless for an operator to be compelled to say "city" and "thru" when sending to one office, while the next office he may send to uses only one form.

Everything should be standardized. I have found no two offices in the United States that used the same system of handling business. This is obviously wrong. I find that in at least two offices in Texas the local blanks are composed of two sheets held together by a perforated line, the lower blank bearing no printing. A carbon sheet is placed between the two blanks to make the office copy, thus doing away with the old water-copy method. This form of blank is a nuisance and a source of delay because it keeps an operator busy removing the carbon sheets from each message as he receives it, and seeing that his blanks are all "loaded" for work. Frequently he gets his carbon between the blanks with the carbon on the wrong side which causes another delay while he re-copies the message. Of course this will not happen when a two-sided carbon sheet is employed. Sheets with only one side carboned are generally used, however.

Again, an operator will "sit in" upon a heavy wire with a lot of these "books" made up and some evil-minded or perhaps jocular fellow-operator will come along and purloin them. This causes more avoidable delay.

Imagine the strain upon any operator working a fast bonus wire trying to do good work by being hampered with this style of blank, which also frequently feeds poorly through a typewriter!

Another point which has been overlooked is the various ways in which the service notations and "time" are placed upon messages by the operators. This should be standardized also. When an operator is sending a message he should first write the number of the message, the distant office call, the sender's signal, the receiver's signal and last and most important, the actual time of sending, thus:

"301 CH. WD. BM. 10:30 p.m.,"

not

"CH. 301 WD. 10:30 p.m. BM."

In case a letter is used with a number to designate a second or third wire, the letter should precede the number, thus:

"B 301 CH. WD. BM. 10:30 p.m."

It is not necessary to dilate further upon this idea; it speaks for itself.

Next comes the form of a received message. The same rule should obtain in this case, with the exception of the time, which should always be written after the signature, either at the right or left side of the blank, at least one line space below the signature. However, it should be noted that a recent ruling omits the sender's signal.

Improper handling of back date messages should also be considered. A message filed at the counter at 11:55 p.m., June 1, for instance, and sent by an operator at 12:01 June 2, should bear the notation: "2nd" immediately after the time, thus, for example: "12:01 a.m., 2nd."

In receiving the same message the receiving operator should always affix the receiving date "2nd" after he has placed the time at the lower side of the message. A message should be handled in strictly proper form in this respect, and I believe in severely reprimanding any failures upon the part of operators who do not adhere to this important point.

When a message requires more than one sheet, each sheet should be as carefully marked as to service and time as the first sheet, either in sending or receiving, breaking if necessary to do this. In sending a back date message, the operator should be compelled to say: "1 dx 2," and not leave it for the receiver who through lapse of memory may have forgotten what day of the week it is.

Finally, I have always made it a point when transmitting a message to send a period after the last word in the body and one after the signature, for the following reasons: Suppose the last word in a message should be "box," "car," "piano," etc., and the sender sends it something like this: "Car-sig John Smith," it confuses the receiver so that he is required to wait to see if the last word ends with the letter "s," or whether the "s" is the first letter of the "Sig." Frequently, also, the words "box," "car," "piano," etc., may be written in the plural and a receiving operator must be wide awake to know what to do in cases of this kind, if the sender does not use periods as suggested. A period before and after the signature is a wonderful help and guards against mistakes. Operators frequently send messages winding up with the signature, omitting the period and then wait a moment or two before starting another message, with the result that the receiver has it something like this: (Sig) "George H. Smith," and thinking

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the message complete has allowed it to be taken away. He, of course, is greatly annoyed and traffic is delayed when the sender, before starting another message, says: "Sig. George H. Smith & Co."

I believe that all serious minded persons in the telegraph service will agree that the foregoing suggestions would, if adopted, be a benefit to employers, employes and the public alike.

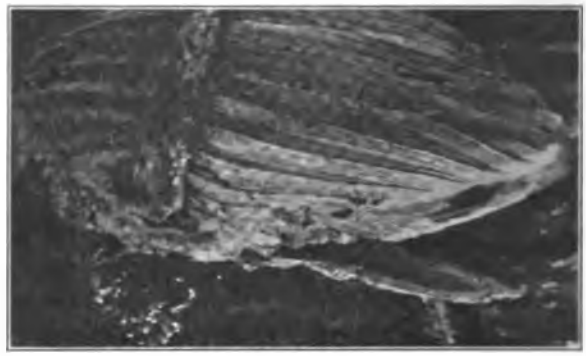
Telegraph Staff of the Santa Fe at Topeka.

The accompanying illustration, from the May number of the *Santa Fe Employes Magazine*, shows the general-office telegraph staff of the Atchison, Topeka and Santa Fe Railroad at Topeka, Kan. Mr. L. M. Jones, superintendent of telegraph, occupies the fourth seat from the left in the front row, and he may well feel proud of his staff of intelligent-looking assistants. They are all young men and women, full of life and hustle, such as is needed on a progressive railroad. There are forty-three men and five women in the group.

TOPEKA TELEGRAPH STAFF OF ATCHISON, TOPEKA AND SANTA FE RAILROAD.

Cable Broken by a Whale.

The accompanying illustration shows a peculiar accident to the Alaskan cable of the War Department between Sitka and Valdez. A whale, evidently feeding, caught the cable in its mouth and in its efforts to free itself threw a loop of the cable around its lower jaw. Not being able to clear itself of the entanglement it drowned, in the meantime having damaged the cable so that it had to be repaired. The cause of the break in the cable was not suspected until repairs were being effected, when the carcass of the whale in an advanced stage of decomposition was hauled to the surface with the cable. The core of the cable was pinched and partly broken between the armor wires by the struggles of the whale. Eight of the eleven armor wires were broken in the twisted portion near the whale's jaw, and it required skillful handling to prevent breaking the cable and losing the end.



CARCASS OF WHALE ENTANGLED WITH CABLE.

The photograph and the facts relating to this unusual occurrence were supplied to us by Brigadier-General James Allen, Chief Signal Officer of the United States Army, Washington, D. C., and by Mr. David Lynch of New York, who was government electrician in charge of the repair work.

Pollak-Virag System of Telegraphy in France.—It was recently reported that the Pollak-Virag system of telegraphy was being used in France by the government for press transmission, but inquiry proves that this is not the case. The Minister of Public Works, Posts and Telegraphs for the French government informs us that the Pollak-Virag apparatus is not used by the Administration. The trial was made between private newspaper offices outside of all control of the Administration, which limited itself to put telephonic circuits at the disposition of the interested parties.

TELEGRAPH AND TELEPHONE AGE is the leading paper in these two fields and is progressive and newsy. Subscription price, $2 00 per year.

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Hard-Drawn Copper Wire.*

BY THOMAS B. DOOLITTLE.

In the fall of 1877, while acting as an agent for the Bell Telephone Company, I received an order from the Ansonia Brass & Copper Company to connect its office and mills by telephone. Samuel Cotter was the general superintendent of the mills. To him I addressed myself, stating that I wished to build those lines of copper wire and to have the wire drawn under my own direction. I well remember his reply: "You can build them of gold if you want to." Thereupon he accompanied me to the wire mill, where he instructed the superintendent to detail a man to do whatever I required.

The problem (if it could be solved at all) was to draw a rod of given size (or number) down to a wire of given size (or number) without annealing, and in this way to produce a wire with the proper tensile strength and ductility. A rod of Lake Superior copper was procured and the experiment began. After repeated trials with rods of different sizes and by the use of many "holes" or dies, in order not to crystallize or granulate the metal by too much strain, the desired result was accomplished, but not until after many trials in which we found the finished product either too brittle or too soft.

It is an interesting fact that drawing the wire eleven numbers produced the result then, and today the hard-drawn copper for line purposes is referred to by the manufacturer as "eleven numbers hard." Although the product is known to the trade as hard-drawn copper wire, and properly so known, as the name indicates its property of hardness and the method of manufacture, the name has no contra term, because soft-drawn copper would be a misnomer. The very process of drawing eliminates the quality of softness and makes it hard.

Previous to the introduction of hard-drawn copper wire much thought and large sums of money had been expended to get the benefit of the superior conductivity of copper for electric line conductors. The first recorded employment of copper wire as a line conductor was its use by Professor Morse in his experimental line between Baltimore and Washington. The ordinary market wire was used, but for the reason that it would not sustain its own weight it was abandoned and iron wire was substituted.

The next on record was strung by the Western Union Telegraph Company in New Jersey. In this case also the ordinary copper wire was used. This proved unsatisfactory and was taken down. An attempt was made to increase the tensile strength by doubling and twisting it. This was done and the wire was put up again. It was still unsatisfactory and was again taken down.

In another experiment steel wire was used with a copper ribbon wound spirally about it. In another case the copper ribbon was folded longitudinally about the steel wire. In another the copper was electroplated on the steel wire. This latter was adopted by the American Rapid Telegraph Company on all of its lines and was manufactured by Wallace & Sons in Ansonia, Conn.

This went the way of all the others for the reason that a chemical action was set up between the steel and copper which destroyed the steel. There were many other and equally futile attempts along the same line. It is to be admitted that the advent of the telephone created a great demand for electric conductors of high conductivity, but it is unaccountable, when we consider the amount of money that had previously been expended and the amount of work that engineers and inventors had given to the subject, that it had occurred to no one to avail themselves of the simplest possible thing—hard-drawn copper wire.

The work of connecting the several mills, offices, and residences of the officials of the brass company was carried on to completion, all lines being of hard-drawn copper. A switchboard was placed in the office of the brass mill and placed in charge of Charles A. Cotter, son of the general superintendent. This was, undoubtedly, the first private-branch exchange in the world.

A portion of the wires in the Bridgeport exchange were of hard-drawn copper and these continued in service for seventeen years, or until they were displaced by underground cable. The wire showed no deterioration. I had the greatest difficulty in trying to introduce this wire. I urged it upon several companies, including the Western Union Telegraph Company. At last I secured the promise of a company to make tests of it, provided the wire could be furnished at the cost of iron. I made the proposition to the Ansonia company without success. One day I met Col. Fred Mason, president of the Bridgeport Brass Company, who said to me:

"Doolittle, there should be something in the telephone field that would interest us."

"There is," I replied, "but you wire people have no sand."

"What do you mean?" said he.

"You will not do what I ask," I replied.

"Now wait: I will do anything you ask," he said. "Now, go ahead."

I explained that I wished him to furnish a given amount of hard-drawn copper wire at the price of iron, pound for pound.

"I will do it," he said. "Send in your order."

I immediately went to the manager of the telephone company and made arrangements for him to send in his order. I went on a long business trip and when I returned was informed that the wire had been strung. I went to the place to see it and make a test and found, much to my surprise and disgust, that they had strung common market wire, cotton covered. They said in explanation that, it being an experiment, they had ordered cotton covered wire so that, if it proved a failure, it could be taken down and used for inside wiring. Of course it proved a failure. The first rain soaked the cotton and the whole line sagged.

In another case I had almost persuaded the management of a company to string a metallic circuit

*Abstract from New England Telephone Topics.

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of copper wire between two important cities, but at last they weakened and, instead of that, they strung a number four iron with a ground circuit. The unusual size and conductivity of this wire only served to increase the induction to a point where it was almost impossible to talk over it.

The objections to hard-drawn copper, without any investigation whatsoever, were of many kinds. That it was too costly; that it would stretch and sag; that it would not stand exposure to the elements; that the structure of the metal was impaired by the process of drawing; that the conductivity was reduced to a point where it would be little, if any, better than iron; that it would be stolen, etc. The most amusing objection was that it would expand from heat of the sun, and not contract to normal when cool. Some one said that if this was the case, it was foolish to draw the wire, for it would only be necessary to lay a rod of copper wire out into the sun. Then with a few hot days and cool nights it would draw itself.

Finally the subject was brought to the attention of Mr. Theodore N. Vail, then general manager of the American Bell Telephone Company. He, with his usual comprehensive grasp of things, authorized me to build a metallic circuit of hard-drawn copper wire between New York and Boston. When Mr. Vail inquired of me regarding the manufacture of the wire, I related to him the experience of Colonel Fred Mason of the Bridgeport Brass Company, and explained to him that his company was loser some hundreds of dollars, and that it would be only fair to give them the contract.

Mr. Vail asked me to send for Colonel Mason, which I did, and a contract was made with him, specifying that the wire should be drawn under my personal supervision.

In December, 1877, I sent samples of the first hard-drawn copper that was made to Boston for tests. After a year of exposure I sent another sample. In February, 1881, at the request of Thomas A. Watson, engineer of the Bell Telephone Company, I made a report on the condition of the wire and forwarded samples of both the old and new wire. My report was referred to Mr. Vail, who instructed Dr. W. W. Jaques, electrician, to make a test of the wire for conductivity, as compared with soft-copper wire, and also as compared with iron wire, and as well with the new hard-drawn copper wire that had not been in service. There was shown to be no perceptible deterioration in any way.

The production of the wire having waited for the man with knowledge of the subject and its application, so its development awaited a man with financial backing, ability and broad comprehension of its possibilities.

Accordingly, in 1883, six years after hard-drawn copper wire had been in constant and absolutely successful service, general manager Theodore N. Vail commissioned me to build a metallic circuit of No. 12 B. W. G. hard-drawn copper wire between Boston and New York. The cost of this experiment was estimated at about $70,000. It must be remembered that in those days and within the telephone interests, $70,000 was a very large sum of money, and in my opinion no man in or outside of the telephone business other than Mr. Vail would have had the courage to undertake the enterprise. I heard it referred to derisively as "Vail's baby."

At this time all the wires were overhead, consequently our copper circuit had to be strung through the network of every intervening city on poles and over housetops. When at last the lines were completed and ready for test, the industrious stringing of exchange wires in the intervening cities kept us in trouble almost constantly.

The Postal Telegraph-Cable Company was the first of the telegraph companies to adopt hard-drawn copper wire in this country, its whole system being built of it.

On August 15, 1885, the American Telephone and Telegraph Company was organized with Mr. Theodore N. Vail as president, myself as vice-president, and Mr. Edward J. Hall as secretary and general manager. The development of the system was rapid, hard-drawn copper wire was generally adopted for toll lines and very largely for exchange lines throughout the world, and its use is constantly increasing. As far back as 1896 the output for the year in this country alone was upwards of eighty million pounds.

With regard to the manufacture of hard-drawn copper wire in recent years, great improvements have been made in the process of manufacture, which cover all operations from the ingot to the finished product. When my experiments were made, it was the practice to roll a billet of copper, say of six or eight inches in width, into a long sheet and then, after being annealed, it was taken to a slitting machine and slit into square rods.

These rods were tapered by means of a hammer, in order that they might be inserted far enough through the drawing die to be grappled on the opposite side, after which they were ready to be drawn into wire. This method of starting with a square rod had disadvantages for the reason that the corners were likely to lap and fold over in the process of drawing, thereby producing flaws or bad places in the wire, these flaws becoming more and more troublesome in the smaller sizes of wire. After having been drawn through a certain number of "holes," the surface requires that it should be annealed before any further reduction in size is practicable. The new process is substantially as follows:

The copper is received from the smelting works in the form of wire bars, which are approximately fifty-four inches long, with an average diameter of about three and three-fourths inches, and weigh about 200 pounds each. These are delivered as commercial copper wire bars.

The first operation is to put the bars into what is termed a "continuous furnace," bars going in at one end of the furnace and taken out at the other. In their passage through they are heated to about 950 degrees centigrade at the rate of about two bars per minute.

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The heated bars are then put through a series of grooved rolls. Each succeeding groove being smaller, the result is a reduction of the three and three-fourths inch bar to a diameter of five-sixteenths inch. These are now called rods, and are taken up on a reel in the form of a coil about thirty inches in diameter. These coils are then taken from the hot-rolling department and are cold at that time. They are then plunged into a bath of sulphuric acid and water for the purpose of removing whatever oxide has been formed in the hot-rolling operation. After about twenty minutes in this solution, the oxide is removed and the rods are then taken and thoroughly washed with clean water under a high pressure from a hose, after which they are immersed in a vat containing a lubricant of tallow and soap. The rods are now ready for the drawing process.

The rods are substantially drawn on what is termed by wire manufacturers a "continuous wire-drawing machine." That is to say, the five-sixteenths-inch rod goes in at one end of the machine, and, after passing through several dies, each one reducing the diameter and hardening the wire, it finally is drawn around a block to the finished size, say 0.104 inch.

In making this reduction, the copper is reduced in diameter from number one wire gauge to number 12 wire gauge or, in technical terms, the wire is "eleven numbers hard." This process gives the wire the greatest amount of tensile strength possible from commercial copper and yet preserves its elasticity. The cost of production is enormously reduced by the new process. Whereas, under the old process, a very skilled workman was required for each single drawing, an attendant is now able to care for several continuous drawing machines that are run at a speed unapproachable by the old method. In the smaller sizes of wire, diamond dies are employed which, in themselves, represent a very considerable investment.

Commercial copper in its soft state has a tensile strength of about 28,000 pounds per square inch, with an elongation of about thirty-six per cent., and by the cold-drawing process above described the tensile strength is increased by each number drawn, and the elongation is reduced; therefore when the copper wire is drawn eleven numbers hard it has a tensile strength of about 64,600 pounds per square inch, with an elongation of about one per cent. The wire is then taken from the wire-drawing blocks, so called, and is carefully inspected for tensile strength, elongation, torsion and conductivity. The inspected wire is then carefully packed by wrapping each coil with burlaps, so that it does not become bruised or damaged in any way by transportation.

The cost of hard-drawn copper wire fluctuates with the price of ingot copper and at present writing is quoted as sixteen cents per pound. The relative cost of copper and iron wire, say of number twelve, is three and three-fourths cents for iron and sixteen cents for copper.

The advantage of copper over iron, besides, is that it is practically indestructible, except from mechanical injury, and if it receives mechanical injury it can be made over into new wire at a cost of about two cents per pound, while iron, which is subject to rapid deterioration from rust, is worthless when taken down.

Bound Volumes of Telegraph and Telephone Age.

Bound volumes of TELEGRAPH AND TELEPHONE AGE for 1910 are for sale at the publication office, 253 Broadway, New York, at $3.50 per copy. This volume is more important and valuable than all its predecessors, and should be included in the library of every telegraph and electrical man. It contains no less than 842 pages of valuable and interesting reading matter, including educational articles, technical descriptions of telegraph, telephone, cable, wireless and other apparatus used in the transmission of intelligence.

The first issue of the year contains a complete directory of the telegraph—land, cable, wireless, railroad, etc. Among the many important articles published throughout the year may be mentioned the following: Wireless Telegraphy and Telephony, by H. S. Webb; History of Telegraph Tournaments, by Walter P. Phillips; Twenty-fifth Anniversary of the Commercial Cable Company; Rapid Cable Telegraphy; A Comparison of the Telegraph and the Telephone, by Charles Selden; New Keyboard Telegraphic Transmitter; Hughes Printing Telegraph System; Mercadier Telegraph System; Barclay Printing Telegraph System; New Western Union Quadruplex, and The Field Quadruplex. There are also many biographical sketches of prominent telegraph and telephone men.

These volumes are neatly bound in cloth, and a vast fund of information is contained within the covers.

For copies address Telegraph and Telephone Age, 253 Broadway, New York.

Busy Men.

One of our agents wishing to have someone else appointed who has more time than he had to look after our interests, gives as an excuse that "Besides my ten hours a day (on an average) in the office, I run a market garden, one greenhouse, thirty feet long and a smaller one, four large hotbeds, lawn and hedge round my place to keep in order, two agencies for insurance companies and one newspaper subscription agency besides one or two other minor things to look after, and also am a lover of the art of fly-fishing and must devote a few afternoons occasionally to the speckled beauties, so taking it all into consideration I think you'll agree with me I have quite enough to attend to without burdening myself with the duties of our professional paper."

Another operator in the West keeps himself busy by engaging in a variety of occupations. His engraved business card announces that he is an importer of French, German and Italian groceries, sole agent for a special brand of olive oil, dealer in a well-known brand of ham and bacon, proprietor of a newspaper and notary public.

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Some Unexplored Fields in Electrical Engineering.*

BY DR. C. P. STEINMETZ.

In discussing the subject of the unexplored fields of electrical engineering, we must consider as belonging to the realm of the electrical engineer, all those phenomena of electricity that are of importance to man: those which are beneficial and useful, and utilized in doing the work of the world, and also those phenomena which are harmful and destructive, and therefore to be guarded against.

It is obviously impossible to touch on all the unexplored fields of electrical energy, for while electrical engineering is not in its infancy any more, nor has been for some time past, there are many more unexplored fields than there are explored fields of electrical engineering; and even in those fields which have been most carefully investigated we find still many unknown regions. A lot of work has been done along many lines since the early days of electrical engineering and a lot of different fields have been uncovered; but there are larger fields still unexplored and there are regions that are still unknown.

To illustrate—there is no simpler and apparently better known phenomenon than the resistance of a conductor. A conductor has a definite resistance which varies with the temperature, etc. With the alternating current the resistance apparently increases in large conductors, because the current flowing in the conductor is not uniform throughout the entire section, but, by the screening effect of the magnetic field inside the conductor, the current density inside of the conductor is less than it is on the outside. We can calculate the phenomena of the lack of uniformity of the current density in the conductor for the case where the current density is not yet very un-uniform, as if in the center of the conductor the current density is only from 5 to 10 per cent. lower than on its periphery. We get an approximation which is satisfactory for all purposes of electrical engineering, and shows us how large a conductor we can use without serious waste of conductor material. Then there is the other extreme, where the current density in the middle of the conductor is practically zero, and the current is limited to a thin shell on the outer surface as in the rail return of the single-phase railway, or in ordinary conductors at very high frequencies, as with lightning discharges. This case we can also calculate, determine the current distribution in the conductor, the apparent penetration and the effective resistance of the conductor, with an approximation as close as our knowledge of the constants of the material, the conductivity and permeability permits. But when you come to the intermediate and probably most interesting case, where there is current even in the center of the conductor, but a material difference in the current density between the outside and the center of the conductor, we find as solution an infinite series, which in this case converges so slowly as to be practically useless, and this case thus is still practically unexplored.

In some fields of electrical engineering or of electrical science we might almost say that we know less now than we knew, or rather believed we knew, a quarter of a century ago. There are things which had been investigated a quarter of a century ago and which were explained in a satisfactory manner to our limited knowledge in the early days, but this explanation does not seem satisfactory now with our greater knowledge.

A curious example we might cite from the textbooks on natural history, for instance. There are supposed to be some fishes which are capable of giving electric shocks. There are some species of gymnotus in the South American mud creeks capable of imparting electric shocks, which have been described a number of times, fishes which have an organ which generates electricity. It has been described as being constituted like a Volta-pile, of a number of successive cells. That theory was quite acceptable twenty-five years ago, but is not satisfactory now. To give a severe shock would require about 500 to 1,000 volts, and it is not intelligible how such voltage could be generated in the conducting animal tissue without being short circuited. Furthermore, the fish is immersed in water, which is a fair conductor, especially sea water, and 500 volts or more would produce hundreds of amperes in the surrounding water, representing hundreds of kilowatts, and it is not intelligible how such a large power could be generated even momentarily. Thus here we have a mystery, because, after all, the descriptions have been so concise that it is difficult to doubt that there are fishes which can give electric shocks. Just why that phenomena has not been investigated by electrical engineers, we do not know, especially when considering that one of the electric fishes, raja torpedo, lives in the Mediterranean and is frequently caught on the Italian shores, as claimed, thus is within easy reach of engineers.

But we do not need to go so far from home; right at hand we have some of the most important uninvestigated phenomena of electricity. The thunderstorm, the lightning, and so forth. In the early days lightning was explained as the discharge of the clouds. The clouds are positively charged, and the ground is negatively charged, and the spark jumps from the cloud to the ground. Speculations were made as to how the clouds became charged, and as then the only method of producing electricity was by friction, it was said it might be the friction of the vapor through the air, or the rain drops through the air, or some other form of friction. That explanation used to appear satisfactory, but with our present knowledge of dielectric phenomena, it is not satisfactory any more.

It was thought that lightning was the discharge from the cloud to the ground. That means that the electric field between the cloud and the ground must

*Abstract of paper presented at the joint meeting of the Electrical Section of the Franklin Institute, Philadelphia, and the Philadelphia section of the American Institute of Electrical Engineers, and printed in the June number of the Journal of the Franklin Institute.

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be beyond the breakdown strength of air. In a uniform field the breakdown strength of air is about 75,000 volts per inch, or nearly a million volts per foot. Even if the cloud is only 1,000 feet above ground, this would require a thousand million volts. If there were an electrostatic field between the cloud and the ground of a thousand million volts extending over the whole area of the thunder cloud, this would represent such an immense amount of electric energy that it is inconceivable how any reasonable source of energy can produce it; how it can exist without having a destructive effect far beyond anything known of lightning. Furthermore, a uniform field cannot well exist between clouds and ground, on account of the unevenness of the ground surface.

We cannot consider the lightning discharge as a simple electric rupture in the same way that an overloaded beam may break mechanically, but as an equalization of internal stresses, about as a piece of hot glass that is rapidly chilled, and thereby full of internal compression and tension strains may suddenly break all over by the internal stresses. So with our present knowledge we must consider as the most probable explanation—although not certain by any means—that the lightning discharge is the phenomenon of the equalization of internal electric stresses in the cloud, and is analogous to the splintering or breaking of an unevenly stressed brittle material, like glass.

Lightning discharges are the result of the voltage inequalities produced in the clouds by the unequal rate of conglomeration of rain particles due to the unequal cloud density.

In agreement with this is that heavy lightning strokes are usually followed by a heavy downpour of rain; in reality they are preceded and caused by it, but it takes time for the rain drops to come down.

We now find that in the study of electrostatics the conceptions of the work of former days is untenable, from our present point of view; we cannot conceive of the dielectric phenomena as a charge on the conductor surface; we know there is not an electric charge on the conductor, the dielectric energy resides not on the conductor surface, but is in the space around the conductor in a dielectric field, and the so-called "charge" is nothing but the termination at the conductor surface of the electrostatic field in space. It is the electrostatic or dielectric field which we must consider as representing the phenomena of electrostatics, in the same way as Faraday has shown us with the magnetic field.

The old conception of the electrostatic charge on the conductor has been the cause of the far greater difficulty which we find in dealing with even simple phenomena of electrostatics, compared with the simplicity with which even apparently complex phenomena are treated by the conception of the lines of magnetic force.

We must then abandon the conception of the theory of electrostatics of the early days—which still largely is used in theoretical text-books—as incorrect and useless. Capacity then is not the capability of the conductor to store electric quantity, but is the ratio of the number of lines of dielectric force, to the electromotive force which produces them, just as permeance is the ratio of the number of lines of magnetic force, to the magnetomotive force which produces them, the "charging current" is no more a current charging the conductor with electricity than the "inductance voltage" is a voltage charging the conductor with magnetism; the former, as "capacity current" supplies the energy stored in the dielectric field, just as the inductance voltage supplies the energy stored in the magnetic field, and dielectric and magnetic phenomena are very largely analogous and treated in the same manner, and with the same simplicity.

Replying to questions during the discussion Dr. Steinmetz said: While we still speak of electricity, or of magnetism, these terms have really ceased to have a definite meaning of some concrete thing or phenomenon, but rather mean an entire class of energy phenomena. With our increasing knowledge, instead of speaking broadly—and vaguely—of electricity, we discuss electric power, electric energy, electric current, voltage, quantity, etc., so that it may be said that there is no such thing as electricity, but there is electric energy, electric power, etc., and the term electricity is applied largely to an entire class of phenomena. We may ask, "What is electric energy?" and then would answer that it is a form of energy which can be transmitted through a conductor, around which conditions of magnetic and dielectric stress are produced.

Some speculative physicists have developed a conception of two forms of electric quantity, negative and positive. Others have denied the existence of positive and recognize only an excess or a deficiency of negative electric quantity. However, in reality, there is no absolute negative or positive, but it is entirely relative. That is, a point which is positive against another point may be negative against a third point. For instance, the negative terminal of the mercury arc rectifier is the positive terminal of the rectified circuit fed by it.

You might define the electrostatic or dielectric field as a condition of stress in space, which exerts mechanical forces on light bodies, and which is polarized, that is, the forces may be in one, or in the opposite direction, positive or negative.

The lightning rod is a great protection, and I would not like to be in an exposed place without such protection. But you must not expect that one rod on one end of the building will completely protect the other end a hundred or more feet away. There must be sufficient rods to extend their protective zone over the entire area; the apex of the roof, and other projecting edges must be protected by connecting wires, etc. That is, like any other apparatus, the lightning rod protection must be installed intelligently and properly to be effective. But the general principle is correct, only it must be rationally applied.

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Portable Storage Batteries as Applied to Automatic Signal on the Harriman Lines.*

The application of portable storage batteries to signal circuits on the Harriman lines began in the year 1890 on the Western Division of the Southern Pacific, under the direction of Mr. W. W. Slater, then master of signals of that company. At the time there were no motor-operated signals on the Southern Pacific lines and the use of portable storage batteries was confined to operating highway crossing bells and indicator and locking circuits at hydro-pneumatic interlocking plants. The type of battery then in use was crude, heavy and of generous dimensions for its capacity. It was found that a considerable saving was effected through the use of these portable storage cells as compared with the cost of operating the circuits with primary and gravity cells and with a view of extending the use of storage cells to several installations of single track electric automatic block signals that were contemplated, tests were carried on for several years with various types of portable storage batteries on the market. The results of these tests were so satisfactory that in 1899 and 1901 when these several installations of automatic signals were completed, the experimental stage had been passed and portable storage cells were decided on as being the least expensive and most satisfactory source of energy for operating the motor circuits.

Gravity batteries were used for the line and track circuits, although later the gravity line batteries were dispensed with and the storage battery served the double purpose of operating both line and motor circuits. At the foremen's headquarters of each installation a charging outfit, consisting of a 2 H.P. gasoline engine, belt connected to a 1 k. w. generator was installed; the foreman attending to the work of charging and inspecting the batteries, and distributing them to the nearest stations on local passenger trains where they were taken to the battery locations by the maintainer on a velocipede or motor car; the discharged batteries being returned to the charging plant in the same manner. From this small beginning the operating officers of the associated lines, comprising the Harriman System, recognized the advantages of automatic signaling as a means of facilitating and safeguarding traffic, with the result that each year additional mileage of automatic signals was authorized, the amount of such mileage usually being the maximum that could be installed by the signal departments of the various lines during the year. With the close of 1910 the entire main lines of the Union Pacific and Southern Pacific from Omaha, Neb., to Oakland, Cal., a distance of 1,779 miles, is protected for the entire distance with automatic block signals, except about 100 miles over the Sierra Nevada mountains, where the electric train staff is in service. Also the main lines of the Oregon Short Line and the Oregon-Washington Railroad and Navigation Company between Granger, Wyo., and Portland, Ore., are protected in a like manner, for the entire distance of 941 miles.

The main lines of the Southern Pacific from Portland, Ore., to El Paso, Tex., and the Sunset Lines from El Paso to New Orleans, a total of 3,226 miles, are protected with automatic signals for a distance of 1,938 miles, or 60% of the entire distance and it is calculated that the remaining 1,288 miles will be completely signaled within two years. The total mileage of road protected by automatic signals on the entire system, on December 31, 1910, was 4,719 miles of single track, and 703 miles of double track, or a total of 6,125 miles of track so protected. On this mileage there are 12,050 automatic signal blades, practically all of which are operated by portable storage battery. There are in all 9,026 battery locations with a total of 48,516 type SS-7 cells in service, of which 12,412 cells, or 25%, are extra cells used for changing.

The method of transportation to and from the charging plants vary with local conditions. On portions of the line where local passenger service is available, the batteries are loaded into the baggage car and distributed at each station by the batteryman, who accompanies the batteries. From the stations they are taken to the various battery locations by the maintainer on a velocipede or motor car, the discharged batteries being returned in the same manner to the station, where they are picked up by the batteryman and brought back to the charging plant on the return train in the evening. On other sections of the line the batteries are loaded into a specially arranged battery car and handled on local freight trains, stops being made at each battery location, where the batteries are changed by the batteryman and the maintainer on that district. The car containing the discharged batteries is sent back to the charging plant on the first freight train. Another arrangement consists of a charging plant built in a box car, which car is moved on the daily way freight and is set out at each alternate station; the batteries being changed out in each direction from the station by the maintainer. During the three years that this portable arrangement has been in service, it has given the best of results, handling on one district 832 cells monthly on a territory of 150 miles of single track signals. An important advantage in this method is that on the 150-mile district referred to only eighty extra cells are required for changing out purposes, this being only 10% of the total number of cells in service in the district.

On the Harriman Lines there are fifty-two charging plants, each of which (except the portable plants) is located at the headquarters of the assistant supervisor, where a shop building is provided, and part of this shop building is used to house the charging machinery, hence no special building is necessary. The average territory covered by each plant is 104 miles. Wherever current can be obtained from local power companies, a mercury arc rectifier or motor generator set is installed and at other locations where electric power is not available, a gasoline engine and generator charging outfit is used. All cells are returned to the plant monthly and are thoroughly inspected and cleaned before being put on the charging circuit.

*Abstract from the Journal of the Railway Signal Association.

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In the case of stationary batteries it is the usual practice to give an overcharge several times a month, the overcharge having the effect of driving the sulphate out of the plates and keeping them in a healthy condition. Portable cells which are chared once a month only, are subject to considerable sulphating and therefore require a long charge to bring them up to capacity. It is the practice to continue the charge for two or three hours after the voltage and specific gravity has ceased to rise. The uniform gassing of all cells on charge is a good indication of their condition and the failure of any cell to gas is investigated before the charge is continued. During the charge, voltage and specific gravity readings are taken and recorded in the book and any cells not coming up to the proper voltage and gravity are closely watched and given special treatment if necessary. Maintainers are required to make weekly inspection of all cells in service, examining them for loose connections, taking voltage readings and replacing any evaporation of electrolyte that may occur during the time the cells are in service. In replacing the evaporation, only water whose purity has been previously passed on is used. In localities where pure water is not obtainable, distilled water is provided.

The Day Letter.

President Theo. N. Vail, of the Western Union Telegraph Company, says regarding the introduction of the new day letter service: "The defects of the telegraph system of to-day are collection and delivery; old fashioned, primitive, slow, unreliable and expensive. It costs more to collect or deliver a message than it does to transmit it. It is like riding from Boston to New York over 220 miles and then paying 20 per cent. more to get yourself and your gripsack down to your hotel.

"Another defect is that out of 25,000 Western Union offices less than 5,000 have enough gross receipts to pay the operating expenses of an exclusive office. Consequently at the other 20,000 offices the staff must be a joint staff; and generally it is a railroad employe, drug clerk, or some similar employe of another business who runs the telegraph business. His first allegiance is to his employer and to his employer's business. The telegraph company is not his employer; consequently the telegraph business is secondary, subordinate. It is the business of this class of offices that very largely makes the reputation of the service. The public cannot discriminate; it does not know anyone but the telegraph company. A company not having this handicap should give an almost faultless service.

"What we are trying to do is to eliminate the imperfections in collection and delivery and also by joint occupancy and joint use with telephone companies get all offices in the custody and charge of employes who have only one interest to serve. Until this is done general improvement cannot be made in the service.

"All telegraph and cable service has been developed along the lines of expedition. But theoretically there can be no greater expedition than under the present methods. An expedited service means surplus facilities to meet the maximum demand and means despatch immediately on receipt. To handle an expedited service during the four or five rush hours of the day means having a plant which must stand idle up to 60 per cent. of its capacity during most of the remaining hours of the day.

"It is our intention to try out first and see if we cannot, without raising present rates, which are very cheap considering service performed, make this regular business the expedited business and ultimately give deferred business at cheaper rates, rather than expedited business at higher rates. We may fail in the attempt.

"It is interesting to know that theoretically Western Union stands to lose $1,250,000 in annual revenue through the day letter. This means that if all messages now sent with enough extra words to make the rate above the day letter rate should be sent as day letters the loss of revenue will be $1,250,000. We must do that amount of day letter business to break even for this innovation.

"I have faith enough in the business and social uses to which the day letter can be put to think that when its advantages are understood it will be exceedingly popular.

"If it succeeds and we have not broken the backbone of the company's revenue, then a deferred short message at some more favorable rate may be considered. But the primary object is to leave the present expedited (i. e., regular business) at present rates with as fast transmission as would be possible at any price."—*Cleveland Telephone News.*

New Books.

"Telegraphy," by T. E. Herbert, has been revised and brought up to date. This volume gives a detailed exposition of the telegraph system of the British Post Office, and while the apparatus shown is of English design, there is much other matter of value to the American telegraph engineer. The subject of telegraphy is very completely covered in the twenty-two chapters of the book, and the descriptive matter is so clearly written that the student should have no difficulty in grasping and absorbing the ideas and information given.

An idea of the scope of the book may be gained from some of the chapter headings, viz.: Fundamental principles; primary cells; calculations in connection with circuits and conductors; galvanometers, resistance coils and shunts; battery testing; single current systems and relays; duplex; quadruplex; repeaters; different systems of telegraphy; construction of aerial lines; construction of underground lines, etc. The appendix includes a complete description of the Murray automatic system. The book has 912 pages and a very complete index to its contents. Price $3.00. Address J. B. Taltavall, publisher, 253 Broadway, New York.

Any book on electrical subjects can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York.

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Co-Operation Between Railroad People and Commercial Companies.*

BY W. P. CLINE,
SUPERINTENDENT TELEGRAPH, ATLANTIC COAST LINE,
WILMINGTON, N. C.

Every superintendent of telegraph believes, and with reason, that upon the efficiency of the telegraph depends, in a large measure, the success of all other departments of a railroad. He may not find many enthusiastic endorsers of this flattering view until, perchance, it fails, somewhere, in the customary performances of its functions; then, the very complaints that pour in upon him, of what it has failed to do, attest its value. His ambition is, therefore, to maintain a service upon which all users may confidently rely.

It is the purpose of this paper to refer to a condition that militates disastrously against his achievement of this object. That condition is the lack of cordial co-operation between local officials and employes of railroads and those of contracting commercial telegraph companies. Wherever such a state of affairs exists, the result must be confusion; and although it may be confined principally to one road, it reflects unfavorably upon others. The subject is believed to be of sufficient general interest to warrant a brief discussion by this body.

In a certain commercial office the wire chief was found one day, figuratively, tearing his hair. He was in a most unhappy frame of mind. The cause of his perturbation was a peppery communication from his superintendent, forwarding an equally spicy complaint of a railroad official, in a distant city, regarding the condition of his railroad wires which were said to be in trouble. The complaint stated that they were always in trouble and that no attention to them could ever be secured. The contract called for wires, and wires must be furnished forthwith.

This wire chief is, indeed, very competent, very vigilant; and, although this statement may be questioned, has every disposition to give the railroads a square deal; but he proved by his log that the wires had never been in trouble; that if they had been, they had come clear before the lineman got there. Anyway, nobody had ever called his attention to them.

This story is not altogether a fancy. The situation as described may not be appreciated by those of us who, having the requisite organization, construct and maintain our own telegraph lines and are, therefore, able to point with pride to a perfect equipment and a perfect service; but to those who must look to a contracting commercial company for the maintenance of railroad wires, it is very real and we know that there is often at least a shadow of justification of such a complaint from a railroad source and also a shadow of truth in the explanation attributed to the wire chief.

As a matter of right, a railroad company expects the wires, batteries and apparatus assigned to its use to be maintained at all times in such condition as to be efficient for railroad service.

As a matter of fact, it is too often true that a very low degree of efficiency is considered good enough for a railroad circuit.

It sometimes appears that the commercial company's wire chiefs are satisfied so long as a railroad wire "works," although it may be in such condition that its use in commercial service would be considered impracticable and if some of us were to find out that our railroad wires were being tested, even occasionally, for insulation and conductivity, or that a lineman or other inspector had visited our railroad offices for the purpose of preventing trouble by discovering and remedying defects before their presence could be made known in the usual way—well, we would be mildly surprised, to say the least.

If this be true, it may be asked, "why talk about co-operation when, apparently, the commercial company is lax in the performance of its contract duty?"

The answer is that without a certain form of assistance from the railroad people, the performance of the commercial company's duty is made so difficult that its human representative, the wire chief, becomes discouraged and, therefore, not unnaturally, indifferent if not actually antagonistic to the railroad's interests.

In a typical case like the one described, it was the custom to rely wholly upon the commercial company to investigate every wire trouble. It was "up to them" because the contract said so. The inevitable result was inefficient telegraph service, with its train of annoyances.

Conditions improved when the custom was changed from absolute reliance upon to at least a partial co-operation with the commercial company. Among the more important details that brought about the improvement was a change in the attitude of railroad officials towards office troubles. It is safe to say that the major proportion of interruptions to railroad telegraph circuits is due to loose connections, open keys or grounds in offices. These are avoidable. Chief dispatchers were directed not to call upon the commercial company to investigate open and grounded wires until they had satisfied themselves that the trouble was not in some office. They were directed also to see that a "wire" signal when used on a railroad wire by the commercial company's wire chief was duly respected and was not to be the signal for a command from a dispatcher or operator to "get out," with, perhaps, a few choice epithets thrown in by way of emphasis.

Roadmasters, also, were reminded that the telegraph line is a very important part of the railroad's equipment and were directed to have their forces give it reasonable attention and make reports of defects that they might be unable to repair.

Pursuance of the policy thus briefly outlined has shown most gratifying results. We believe, however, that our success in having these standards applied and, consequently the quality of our telegraph service, will depend very largely upon the extent to which we shall be able to bring our own people to realize the value of and the necessity for free co-operation with our commercial friends.

*Paper read at the Convention of the Association of Railway Telegraph Superintendents, Boston, Mass., June 26.

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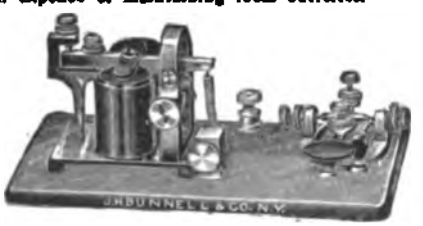

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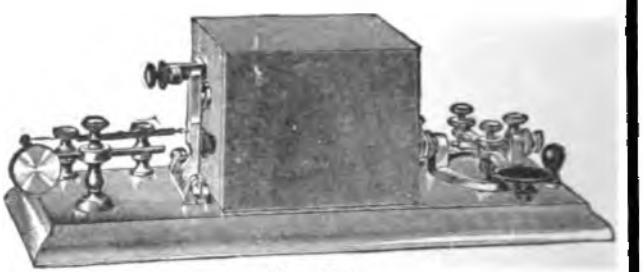

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Railway Efficiency.*

BY RALPH W. POPE, NEW YORK.

The commercial activity of a country is based on production and distribution. The main factor in distribution is transportation, and this is the service for which the railways are mainly responsible. To carry on this work with safety, convenience and celerity, the telegraph department has become practically indispensable. If, therefore, the inefficiency of the railway management is represented by an expenditure of $300,000,000 annually the telegraph departments of the various companies would naturally be called upon to assume their share in the general increase in efficiency.

In considering the question of efficiency the peculiar character of the railway problem confronts us. Scientific management has been so prominently exploited that it has been hailed as the forerunner of universal prosperity. The examples cited usually indicate that by means of scientific methods a tremendous gain has been possible in the output of each human unit engaged in coal shoveling, pig iron shifting and bricklaying. It is obvious that similar gains in efficiency are possible and have been made in the past in various branches of manufacturing.

The increase of output has been the constant study of manufacturers, and in many cases at the sacrifice of quality and durability. The retail price of many manufactured articles is so small that we can scarcely realize the possibility of its covering the actual cost of labor and material, without reckoning the usual margin of profit. At any time, and in any part of the country, articles manufactured in large quantities may be purchased even at retail at prices which indicate that little can be expected from increased efficiency.

Using the language of Mr. Julius Kruttschnitt, Director of Maintenance and Operation, Union Pacific System and Southern Pacific Company, in a lecture delivered at Harvard University, April 26: "A railway is a machine designed to manufacture freight and passenger transportation; it makes ton miles and passenger miles."

Viewed as such a machine it is obviously inefficient, because it cannot be operated to its full capacity at all times, for the simple reason that equipment and labor must remain idle at certain hours on different lines which in the aggregate appears as a stupendous yet apparently unavoidable waste. This is more apparent on single track than double track lines, and it has been the mission of the telegraph to facilitate train movements, as far as may be compatible with safety. The telegraph is an important part of the "machine" but is not considered a revenue producer like the freight and passenger service. It must carry its own burden of cost of operating and maintenance and will no doubt be expected to share in any general increase of efficiency. Every branch of the railway service has for years been represented in various technical associations, twenty-five of which are national in character. There are more than this number of local clubs, and all of these organizations through their meetings, conventions and committees, are continually engaged in the promotion of efficiency in their various departments. This work is in the hands of experts in their respective lines, and is regularly and systematically supplemented by the technical journals. Not only is every advance step promptly and accurately published, but even the minutest details of improved methods are spread broadcast through the collections of "shop kinks" for the benefit of whoever is interested in railway work. All of this makes for efficiency and possesses the important feature of being exempt from overhead charges, and revolutionary innovations, which may be irritating to managers as well as employes.

This question of efficiency should be thoroughly studied in connection with the introduction of the telephone, into the domain of the telegraph. The superiority of the telephone for certain purposes is, of course, admitted by all. In a certain sense a great railway system is an active community in itself. Its organization embraces the entire industrial field. It operates factories and shops, cultivates gardens and forests, it runs hotels and steamships, it has its legal and medical departments, and is generally believed to at least be interested in municipal, state and national affairs. If the telegraph has a field of its own in our national life, surely it must also be a necessity in railway organization.

In the exchange of ideas bearing upon the welfare of the telegraph, do not for a moment quail at the suggestion of "higher-efficiency." This has been your purpose, and it was for this object that the Association of Railway Telegraph Superintendents was organized.

*Paper read before the Convention of the Association of Railway Telegraph Superintendents, Boston, Mass., June 26-30.

The Eiffel Tower Wireless Station.

At the recent meeting of the Société Française de Physique in Paris, Commandant Ferrié described the wireless telegraph station of the Eiffel Tower. This station is particularly remarkable, says Mr. S. H. Russenberger in *Electrical World*, because the antenna is supported by a tower 300 meters in height, which permits the receipt of communications from a great distance, even from America. Thus the visitors were able to read in the dispatch book messages that a gentleman signing himself Charles and another gentleman signing himself Adolphe sent to Mlle. Polaire at the moment when that charming actress started on her return to France. These two gentlemen will doubtless be less enthusiastic over the great modern discovery when they learn that their declarations were readable more than 5,000 miles beyond the beloved object to whom they were sent. The writer placed his ear to the telephone receiver, but did not have the good fortune to hear a communication of this importance. He simply received the time of day from the station at Gibraltar, 900 miles from Paris.

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CONVENTION OF ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.

The annual convention of the Association of Railway Telegraph Superintendents was held at the Hotel Brunswick, Boston, Mass., June 26-30, and was largely attended.

In the absence of President I. T. Dyer, of Los Angeles, Cal., First Vice-President J. B. Sheldon, of Omaha, Neb., presided.

The first session was called to order at 2.15 p. m., and in opening the proceedings the acting president referred feelingly to the absence of President Dyer, and then spoke of a distinguished guest present, Mrs. George S. Minot, a niece of the late Charles Minot, general superintendent of the Erie Railroad, who sent the first telegraphic train order, which event is to be commemorated by the erection at Turner, N. Y., of a monument.

Mr. E. P. Griffith, chairman of the Turner Monument Fund in a few well chosen remarks introduced Mrs. Minot, who thanked the members for the distinction paid her. Mrs. Minot resides in Brookline, Mass.

Mr. A. N. Bullens, assistant superintendent of the contract and revenue department of the New England Telephone and Telegraph Company, Boston, on behalf of that company and the American Telephone and Telegraph Company, extended an invitation to the members to the free use of the local service at any time during the convention and of the toll service between the hours of 4 p. m. and 9 a. m. The two telegraph companies also extended like courtesies.

After the approval of the minutes of the Los Angeles convention of last year, Secretary Drew read a letter from President Dyer expressing his regrets at his inability to be present on account of ill health. Mr. Dyer referred to the excellent work of the Association during the year, and mentioned especially the labors of the Committee on High Tension Wire Crossings. Regarding the time of holding meetings he suggested the propriety of setting a fixed date for the conventions, and thus avoid the annoyance of changes of dates as has been done on one or two occasions lately. He praised the work of the officers and the various committees.

After the reading of telegrams from absent members the following new members, active and associates, were elected by ballot:

Active—H. A. Shepard, assistant superintendent telegraph, New York, New Haven & Hartford R. R., New Haven, Conn.; H. A. Vaughan, assistant superintendent telegraph, Chicago, Burlington & Quincy, Lincoln, Neb.; G. L. Candler, superintendent transportation, Central of Georgia, Savannah, Ga.; G. O. Perkins, superintendent telegraph, Chicago, Great Western, Chicago; F. E. Camp, inspector of telegraphs, Canadian Pacific Ry., Revelstoke, B. C.; E. A. Speer, inspector of construction, Canadian Pacific Railway, Toronto, Ont.; E. M. Payne, inspector of telegraph, Canadian Pacific Railway, Winnipeg, Man.; J. E. Golden, superintendent telegraph, Tidewater Pipe Line Company, Bradford, Pa.; C. W. Stockdale, general foreman, Illinois Central, Chicago, Ill.; C. W. Bradley, acting superintendent telegraph, Chesapeake & Ohio, Richmond, Va.; A. C. O'Brien, telephone inspector, Boston & Maine, Boston, Mass.

Associates—G. K. Heyer, Western Electric Company, New York; C. T. Wilkinson, General Electric Company, Schenectady, N. Y.; D. W. Dean, special agent, American Telephone & Telegraph Company, St. Louis, Mo.; A. F. Everman, Bell Telephone Company, St. Louis, Mo.; W. L. Cook, sales-engineer, United States Electric Company, Chicago; J. H. Finley, Western Electric Company, Chicago; E. L. Howk, Western Electric Company, Chicago; Vernon Durbin, Holtzer-Cabot Company, Brookline, Mass., W. O. Nevil, special agent Missouri & Kansas Telephone Company, Kansas City, Mo.; Henry Homer, special agent American Telephone & Telegraph Company, Philadelphia, Pa.; E. Whitmore, Manhattan Electric Supply Company, New York; A. D. Smith, Northern Electric Manufacturing Company, Montreal, Que.; J. F. O'Donnell, manager Western Union Telegraph Company, Joplin, Mo.; H. G. Thompson, manager Edison Storage Battery Company, Orange, N. J.; L. H. Merrill, special agent Northwest Telegraph Exchange, Minneapolis, Minn.; G. Brown, Western Electric Company, New York; E. E. Hudson, manager of sales, Edison Storage Battery Company, Orange, N. J.; A. G. Francis, railroad agent, Chicago Telephone Company, Chicago, Ill.; E. M. Fisher, commercial superintendent, Cumberland Telephone & Telegraph Company, Nashville, Tenn.; R. B. Crane, general sales agent, Rock Island Battery Company, Cincinnati, Ohio; A. D. Walters, special agent, New York Telephone Company, New York; E. V. Adams, railroad sales agent, Western Electric Company, Chicago; H. B. Fenn, special agent for Railroads, New York Telephone Company, Newark, N. J.; L. G. Martin, Okonite Company, New York, N. Y.

G. A. CELLAR,
of Pittsburg, President Association of Railway Telegraph Superintendents.

Secretary Drew then read his report, which showed the Association to be in better financial condition than ever before in its history, having a sub-

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stantial balance in bank. At the time his report was made up there were 102 active members in good standing and 67 associates, making a total of 169 members in good standing, notwithstanding the increase in dues.

The report of the auditing committee was then read by Chairman A. B. Taylor. This report and that of the Secretary-Treasurer were adopted.

The report of the executive committee was received. Some changes in the constitution were recommended.

Hon. J. F. Fitzgerald, Mayor of Boston, was then introduced and spoke in complimentary terms of the association, and extended a hearty welcome to the city. He referred to the historical, educational and literary features of the city and the independence breathed in its atmosphere.

Speaking of the telephone and the telegraph, he stated that he had a great admiration for Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company. He (Mr. Fitzgerald) and Mr. Vail were very good friends and Mr. Vail had a master mind. He compared telegraphy and telephony abroad with those services in this country and told of an instance where, in Paris, it took him four hours to get a telephone connection three blocks away in the middle of the night. He also referred to the necessity of having to speak several languages in order to get a long distance telephone connection in Europe, and paid a high compliment to the service in this country. Mayor Fitzgerald closed his remarks with a song which he said he sang in the last campaign and has been singing ever since. His address had many humorous touches and was enthusiastically received.

Mr. G. A. Cellar was called upon to reply to Mayor Fitzgerald, which he did in a humorous yet dignified manner.

After the presentation of the report of the topics committee, of which Mr. W. C. Walstrum is chairman, Mr. W. J. Camp read a paper entitled "Some Hints." A lengthy discussion followed the reading of the paper and was participated in by Messrs. Griffith, Johnson, Ditch, Caskey, Kissinger, Cellar and A. B. Taylor. Mr. Johnson asked Mr. Camp if he had found any trouble with porcelain insulators on account of smoke and if he had experienced any difficulty from cobwebs in insulators. On certain parts of his line, he said, cobwebs were very troublesome. Mr. Camp stated that smoke deposits upon insulators lower the insulation of the line very much but that they could be washed off. The same trouble applied to glass insulators as well. He had no trouble from cobwebs on his lines on account of the dryness of the climate, except in the maritime provinces, where the atmosphere is moist.

Mr. Cellar stated that a more rigid inspection was necessary for porcelain insulators than for glass.

On the subject of transposition Mr. A. B. Taylor found that transposition of telephone lines every half mile on his road answered every purpose. Mr. Camp referred to the transposition designed by Mr. R. E. Chetwood, engineer of construction of the Western Union Telegraph Company, New York.

Mr. J. C. Johnson stated that transposing on his road, the Pennsylvania, was laid out scientifically, and took into account every factor of situation, influence, etc. All his wires were paired for telegraph as well as for telephone purposes, and the transposition was made from the telephone standpoint. Referring to the subject of lightning protection he stated that his company used all the lightning protection it could.

Mr. Sheldon said that Brach lightning arresters had been used on his lines for several years and were giving very satisfactory service. Each office was equipped with an arrester.

The meeting then at 5:15 p. m. adjourned until 10 a. m. Tuesday.

TUESDAY'S SESSION.

The meeting was called to order at 10:15 a. m. by Acting President Sheldon who introduced Mr. Belvidere Brooks, general manager, Mr. A. G. Saylor, general superintendent, and Mr. R. E. Chetwood, engineer of construction, Western Union Telegraph Company, New York. Each of these gentlemen made a few remarks expressing their pleasure at being present and hoped that the convention would be a profitable one. Mr. Saylor stated that no organization in the world had produced so many intelligent and able men as the telegraph.

Mr. W. P. Cline then read a paper on "Co-operation Between Railroad People and Commercial Companies." (The paper is published on another page of this issue.) The discussion, which was participated in by Messrs. Selden, Griffith, Camp and Chetwood, brought out much valuable information relating to telegraph line construction and maintenance.

Mr. Saylor emphasized the importance of good wire service and related some of his early experiences with railroad lines. He commended the present system of specialized maintenance as practiced in the divisional organization.

Mr. Griffith spoke of the rapidity with which telegraph troubles are cleared in modern railroad practice.

Mr. Chetwood stated that the present 15-ampere fuse with a carbon block will eventually give way at the outer end of cables to a fuse protection, the lightning protection all being outside the office. An arrangement of switching is now being planned by which through wires running through offices closed for the night can be switched out of the office.

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Mr. Camp referred to the difficulty of simultaneous operation of railroad and commercial service on his lines.

Mr. Chetwood stated that the double-petticoat porcelain insulator is about four times as good as glass, but final conclusions are yet to be established. Signs of aging of porcelain are apparent. A new type of double-petticoat glass insulator has been designed and tests indicate about 75 per cent. better insulation than former types, besides being less fragile than the older types. At this time a porcelain insulator does not appear generally justified for telegraph lines except for exceptionally long haul service. A porcelain insulator to be of any value must be absolutely non-absorbent.

Mr. Saylor cited the difficulties of operating iron wires in rainy weather regardless of the type of insulator used.

Messrs. Selden, Chetwood and Camp spoke of the relative advantages of iron and wooden insulator pins.

Mr. J. L. McQuarrie of New York then read a paper on "Some Observations on Telephone Transmission."

The afternoon session opened with a discussion of Mr. McQuarrie's paper. Mr. Wm. Maver, Jr., characterized the paper as an historical and practical discussion of the subject. Messrs, C. Selden and J. J. Ghegan also spoke briefly.

Mr. G. A. Cellar then presented the report of the High Tension Wire Crossing Committee. The report was received and approved and the committee continued. The Western Union and Postal Telegraph-Cable Telegraph Companies and the American Telephone and Telegraph Company are to be invited to co-operate in future work in this direction.

Mr. W. W. Ryder read Mr. R. W. Pope's paper on "Railway Efficiency." There being no discussion, the report of the Committee on Form for Delivery of Messages to Trains, Etc., was read by Mr. E. P. Griffith, chairman. No uniform form has yet been agreed upon, but having ascertained the sentiment of the telegraph companies on the subject, a satisfactory conclusion of the committee's work is assured.

The Turner Monument Fund was the next subject taken up. Mr. E. P. Griffith, chairman of the Fund, gave a brief history of the project. He read the report of the treasurer, Mr. J. B. Taltavall, which showed total receipts up to June 23 of $1,616.25; expenses, $127.22; retainer to Charles Keck, sculptor, $50.00; total expenses, $177.22, leaving a balance on hand of $1,439.03.

Mr. Griffith then read a letter from Mrs. E. H. Harriman, of Arden, N. Y., in which that lady very generously offered to meet the expense of the monument and its cutting. The committee therefore was thus enabled to report the matter closed, which announcement was greeted with applause. Mr. Griffith announced, however, that those present who had not yet subscribed to the fund had the opportunity to do so. He suggested that the association be represented by a committee at the dedication of the monument in the fall. The report was accepted and approved. The correspondence between Mr. Griffith and Mrs. Harriman is published on another page.

A paper on "Line Conductor Requirements for Telegraph Transmission" was read by Mr. F. F. Fowle, of Chicago. The paper was a very comprehensive discussion of the subject and pointed out the effect of line leakage upon operation, which hitherto had not been given as much consideration as its importance warranted.

The effect of leakage was practically demonstrated by means of a simplex outfit. The two terminals of a line were represented by the usual instruments side by side on the same base. These were connected by an artificial line equivalent to an actual line 500 miles in length the leakage and insulation being varied by means of switches. The effect of leakage upon the operation of the line was very clearly demonstrated by means of this apparatus.

Mr. W. Tassin supplemented Mr. Fowle's paper with a description of the methods employed in manufacturing copper clad wire, and illustrated his subject by means of lantern slides showing views of the works of the company manufacturing this wire and micro-photographic pictures of cross sections of copper clad wire showing the complete union between the steel core and the copper covering.

After a vote of thanks to Mr. Fowle the meeting adjourned until Wednesday morning.

WEDNESDAY'S SESSION.

The Wednesday morning session was called to order at 10 o'clock. Messrs. W. W. Ryder, U. J. Fry and W. Marshall were appointed a committee to confer with a like body from the Railroad Telephone and Telegraph Appliance Association in order to arrive at a better understanding of the relations between the two organizations and to discuss matters of interest to both associations.

Mr. J. F. Caskey then read a paper by Mr. John B. Adams on "Telephone Cable Transmission." This paper was a highly practical discussion of the subject and contained basic rules for the determination of telephone transmission, describing the rules in non-technical language. It was based upon original data collected in the manufacture of telephone cables. The paper contained curves of resistance and capacity co-efficients.

"Current Supply for Selective Calling Systems" was the title of the next paper which was read by the author, Mr. W. E. Harkness, of New York. He first considered the number of selectors that can be operated under various combination systems with and without clearing-out signals, and following with a detail consideration of the cost of equipment and annual charges. The paper was

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discussed by Messrs. J. F. Caskey and W. J. Camp.

Mr. W. Maver, Jr., of New York, then read a paper on "High Speed Automatic Perforators, or Perforator Receivers," which was followed by a highly interesting discussion participated in by Mr. A. G. Saylor, Mr. P. W. Drew and Mr. W. J. Camp.

On motion of Mr. W. J. Camp a vote of thanks was tendered to Mr. Maver for his paper. An abstract of this paper together with the discussion it gave rise to will appear in a later issue.

A paper entitled "Economy in the Telegraph Department," by Mr. Wm. Bennett, of Chicago, was read by Mr. W. F. Williams in the absence of the author, and was followed by a lengthy and interesting discussion, supplemental to which Mr. U. J. Fry, of Milwaukee, described the simplex train dispatchers telephone circuit used on his road. He has five of these circuits between Butte, Mont., and Seattle, Wash., a distance of 656 miles, and is equipping five circuits between Butte and Mowbridge, 720 miles, making a total of 1,376 miles. There is one repeating station between Butte and Seattle. These circuits are now working duplex regularly. In the event of a quadruplex giving out one of these circuits can be used to patch the quad.

After some discussion on Mr. Fry's address, Mr. G. K. Heyer, of New York, read a paper on "Telephone Economy in Railway Service."

After a brief executive session various committees submitted their reports and the subject of the next meeting was taken up. New York, Omaha, Milwaukee, St. Louis, Peoria, Ill., and other places were proposed, but Mr. A. B. Taylor made such an effective plea in behalf of New York that it was voted to hold the 1912 convention in that city, June 24 being the time set.

Amendments to the constitution were submitted by the Executive Committee and adopted. The amendment to Section 2, Article V, relates to the number of members that shall constitute a quorum of the executive committee; that to Section 6, Article V, empowers the presiding officer to appoint a sufficient number of active members to form a quorum of the executive committee in the event of a quorum of that committee not being present at an annual meeting, for the sole purpose of acting upon applications for membership. Section 1 of Article VI was amended to authorize the executive committee to change the time and place of an annual convention from the date originally set, after due notice to the members.

Officers were elected as follows:

President, Mr. G. A. Cellar, Pittsburg; first vice-president, Mr. Wm. Bennett, Chicago, Ill.; second vice-president, Mr. A. B. Taylor, New York; secretary and treasurer, Mr. P. W. Drew, Chicago, Ill.

The new officers, excepting Mr. Bennett who was absent, were then installed and after a few remarks of thanks from each the convention adjourned.

ATTENDANCE.

Active Members.—W. W. Ashald, Montreal, Que.; C. W. Bradley, Richmond, Va.; W. J. Camp and wife, Montreal, Que.; J. F. Caskey and wife, South Bethlehem, Pa.; G. A. Cellar, Pittsburg, Pa.; W. P. Cline, wife and daughter, Wilmington, N. C.; W. L. Connelly and wife, Chicago, Ill.; J. H. Ditch and wife, Altoona, Pa.; P. W. Drew and wife, Chicago, Ill.; L. B. Foley, New York, N. Y.; U. J. Fry, Milwaukee, Wis.; T. R. Gooch and wife, Richmond, Va.; O. C. Greene and daughter, St. Paul, Minn.; E. P. Griffith, wife and son, Jersey City, N. J.; T. M. Haston, wife and niece, Bloomington, Ill.; J. L. Henritzy, Denver, Col.; E. D. Hubbard and wife, Battle Creek, Mich.; J. G. Jennings and wife, Chicago, Ill.; J. C. Johnson, wife and daughter, Philadelphia, Pa.; E. C. Keenan and wife, Cleveland, Ohio; V. T. Kissinger and wife, and Mrs. A. V. Cornish, Chicago, Ill.; C. L. Lathrop and wife, Angelica, N. Y.; L. A. Lee, wife and daughter, Pittsburg, Pa.; C. M. Lewis, Reading, Pa.; M. Magiff and wife, St. Albans, Vt.; W. Marshall, Toronto, Ont.; J. T. Nolan, Washington, D. C.; A. C. O'Brien, Boston, Mass.; G. O. Perkins, Chicago, Ill.; W. H. Potter and wife, Washington, D. C.; C. S. Rhoads, Indianapolis, Ind.; Thos. Rodger, wife and daughter, Montreal, Que.; J. J. Ross, Detroit, Mich.; W. W. Ryder, wife and two sons, Chicago, Ill.; C. Selden, Baltimore, Md.; J. B. Sheldon and wife, Omaha, Neb.; E. A. Smith, Boston, Mass.; N. E. Smith and wife, New Haven, Conn.; A. B. Taylor and wife, New York, N. Y.; B. F. Thompson, Baltimore, Md.; S. L. Van Akin, Jr., Syracuse, N. Y.; F. H. Van Etten, wife and son, Chicago, Ill.; H. A. Vaughan, Lincoln, Neb.; J. M. Walker and wife, Denver, Col.; W. C. Walstrum and daughter, Roanoke, Va.; B. Weeks and son, Memphis, Tenn.; F. T. Wilbur, Chicago, Ill.; W. F. Williams, wife and daughter and Miss Neeley, Portsmouth, Va.; F. S. Work, Warwick, N. Y.;

Associate Members.—E. V. Adams, Chicago, Ill.; G. Brown, New York, N. Y.; A. N. Bullens, Boston, Mass.; W. L. Cook, Chicago, Ill.; W. F. Crowell and wife, New York, N. Y.; Albert Douglas, Chicago, Ill; A. P. Eckert, wife and daughter, New York, N. Y.; H. B. Fenn, Newark, N. J.; E. M. Fisher and son, Nashville, Tenn.; F. F. Fowle, Chicago, Ill.; A. G. Francis, wife and two sons, Chicago, Ill.; M. F. Geer, Rochester, N. Y.; J. J. Ghegan, wife and daughter, New York, N. Y.; W. E. Harkness, daughter and sister, New York; G. K. Heyer, New York, N. Y.; H. Homer, Philadelphia, Pa.; E. E. Hudson, Orange, N. J.; B. A. Kaiser and wife, New York, N. Y.; J. M. Lorenz and wife, Chicago, Ill.; P. W. Miller, New York, N. Y.; Val B. Mintun, Kansas City, Kan.; W. O. Nevill, Kansas City, Kan.; G. W. Peck, New York, N. Y.; C. N. Sigison, New York, N. Y.; G. W. Swan, New York, N. Y.; A. D. Walters, New York, N. Y.; A. Wray and wife, Chicago, Ill.

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VISITORS.—Miss M. L. Allison, Chicago; Belvidere Brooks, New York; F. C. Cosby, Boston; D. J. Cavanaugh, Memphis, Tenn.; Mrs. E. A. Chenery, St. Louis, Mo.; R. E. Chetwood, New York; L. E. Dodge, Rochester, N. Y.; W. H. Graffis, Chicago; R. N. Hill, New York; E. A. Hawkins, New York; Richard S. Harris, Pittsburg, Pa.; G. A. Joy, Chicago, Ill.; D. C. Keefe and wife, New York; H. P. Kimball, New York; H. S. Knowlton, Newton, Mass.; Edgar Lowe, Jamaica, N. Y.; R. C. Leake, Rochester, N. Y.; Mrs. G. S. Minot, Brookline, Mass.; J. L. McQuarrie, New York; L. G. Martin, New York; W. C. Merly, New York; E. L. Marshall, Fremont, Ohio; Wm. Maver, Jr., and two daughters, New York; C. S. Rhoads, Jr., Sandwich, Ill.; A. G. Saylor, New York; O. D. Street, New York; R. F. Shamer, New York; A. D. Smith, Montreal, Que.; H. N. Tucker and wife, Boston; Mrs. N. J. Tidby and son, St. Paul, Minn.; T. R. Taltavall, New York; H. G. Thompson, Orange, N. J.

The technical press was represented by Mr. W. H. Graffis of *Telephony*, Chicago; Mr. H. S. Knowlton, Boston editor of the *Electrical World*, New York, and Mr. T. R. Taltavall, of TELEGRAPH AND TELEPHONE AGE.

ENTERTAINMENT.

On Monday evening the members and others attending the convention were entertained at the "Pop" concert at Symphony Hall.

Tuesday morning was devoted to local sight seeing and at 2 p. m. the ladies were taken on an automobile trip along the North Shore. In the evening a trip was made to Revere Beach and everyone enjoyed the diversions offered by this resort.

The entire day Thursday was devoted to an excursion to Plymouth where the party went over the hallowed grounds at that place. The historic rock was naturally the centre of interest. The weather was delightful and the trip was greatly enjoyed.

The entertainment committee deserve much credit for the able manner in which they performed their duties. Each member was around early and late to see that everyone got the utmost enjoyment out of their visit, especially the ladies.

NOTES OF THE CONVENTION.

Mr. Belvidere Brooks, general manager, Mr. A. G. Saylor, general superintendent, Mr. R. E. Chetwood, engineer of construction, and Mr. W. C. Merly, secretary to the general manager, arrived from New York Tuesday morning. Messrs. Brooks, Saylor and Chetwood received a hearty greeting on their appearance at the meeting and were given places of honor on the platform with acting president Sheldon.

Mr. Jasper N. Keller, president, and W. J. Denver, general manager, of the New England Telephone and Telegraph Company, Boston, both old-time telegraphers, were accorded a hearty reception during Wednesday's session and made a few remarks.

Exhibits.

The Okonite Company, New York, was represented by Mr. L. G. Martin.

The National India Rubber Company, New York, was represented by Mr. A. P. Eckert, sales manager, wire department, New York.

The National Carbon Company, Cleveland, Ohio, made an extensive display of Columbia dry batteries, track batteries, and multiple batteries for motor ignition, and distributed a plentiful supply of literature.

The American Telegraph Typewriter Company, New York, had an operating exhibit. The company was represented by Dr. G. A. Cardwell, president; Mr. Allen Cardwell, son of Dr. Cardwell; Col. W. H. Eckert; Mr. H. C. Adam, secretary, and Mr. James Uncles of the engineering department.

J. H. Bunnell & Co., New York, was represented by Mr. J. J. Ghegan, president, who exhibited a Ramsey cable jack or quick switch. This switch was described and illustrated in these columns in a recent issue. Mr. Ghegan distributed as souvenirs a very useful automatic tape measure.

The National Telephone Selector Company, New York, exhibited its new alternating-current, open circuit telephone selector system for train dispatching and its non-grounded simplexing intercommunicating selector system for message circuits. The company was represented by Mr. G. M. Seeley, vice-president, and Mr. E. Kleinschmidt, engineer.

The Holtzer-Cabot Electric Company, Brookline, Mass., had a complete exhibit of H.-C. tubular wire connectors. These connectors are seamless drawn and make perfect self-welding joints that are said to be stronger than the wire itself. The company was represented by Mr. C. H. Gogel, Jr., Southern representative of the company, Baltimore, Md.

The American Telephone and Telegraph Company was represented by Mr. B. A. Kaiser, and G. W. Peck, New York; Albert Douglas, Chicago, and H. Homer, Philadelphia. The Missouri and Kansas Telephone Company's interests were looked after by Mr. Val B. Mintun and W. O. Nevill of Kansas City, Mo., and Mr. A. G. Francis represented the Chicago Telephone Company and Mr. Henry Miller the New York Telephone Company.

The Randall Telephone Manufacturing Company, New York, had a working exhibit of its high power telephone train dispatching transmitter. The Randall telephone train dispatching outfit was also shown.

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It consists of a high power transmitter on an adjustable arm together with a loud-speaking telephone receiver. This type of receiver does away with the necessity of head gear. Mr. C. Adams-Randall, consulting engineer, New York, and Mr. A. B. Rogers, secretary, Boston, were in attendance and gave practical demonstrations of the operation of the apparatus.

The Western Electric Company occupied parlor "E" and had a complete display of railway telephone and selector equipment. Practically every kind of telephone apparatus used on railways and selector equipment was shown in practical operation. The loud speaking receiver was exhibited on this occasion for the first time and attracted much attention by its clear enunciation. The rotophone transmitter arm was also shown for the first time. Other apparatus displayed included the new semaphore recently developed by the company; transmitters and receivers of various types, portable telephone and pole, etc. Other apparatus shown was a new master selector key, of the push button type, with a capacity of forty stations. It is contained in a box 18 inches long by 6 inches high. The company was represented by Messrs. G. K. Heyer, O. D. Street, E. A. Hawkins, J. L. McQuarrie, O. E. Stephens, R. F. Spamer, of the New York house; Mr. E. V. Adams, of the Chicago house, and Messrs. E. L. Hawkins, W. F. Abley and H. B. Gilmore, of the Boston house.

The General Railway Signal Company, Rochester, N. Y., showed the complete apparatus used in its system of selective signalling. The complete equipment consisted of a selector; a bell, operated by either direct or alternating current; a bank of individual keys; a storage battery consisting of six cells of 80 ampere hour capacity each, and a switchboard on which were mounted all the necessary accessories for the operation of the system. The most unique feature is the means for furnishing current to the line for the operation of the selectors, which consist of a storage battery and a motor generator set. The initial movement of a key in sending a call starts the motor generator set which is so designed that it attains a sufficient speed in a small fraction of a second to boost the battery voltage to line voltage; the final movement of the key in returning to normal position automatically breaks the circuit of the battery and the motor generator. This system it is stated obviates the necessity of a large central station battery and is claimed to reduce the cost of current. The company was represented by Mr. M. F. Geer, sales engineer; Mr. R. C. Leake, assistant engineer, and Mr. Lyman E. Dodge, patent attorney.

The United States Electric Company, New York, had a complete exhibit of the Gill selective calling as applied to railway operation, in telephone and telegraph train dispatching and message service and to the dispatcher-controlled train-order semaphore. A train dispatcher's desk was shown fully equipped for operation and a circuit of ten Gill selector stations was set up in the parlor. The box outfits include selectors on both two-figure and four-figure combinations and for calling by main line and by local battery bells. The new two time-wheel selectors, making a call in three seconds were also shown. For emergency work there was a complete portable dispatcher's outfit. The way station telephone apparatus was shown set in a box and also a leather cased hand telephone set. The selective train order semaphore was a prominent feature of the exhibit. When thrown to "danger" the signal reports itself audibly by induction over the telephone wire and is mechanically locked against clearing until the dispatcher gives electrical permission so to do. This system operates as far as a telegraph impulse may be effective. Other apparatus shown included a phantom coil set in a box and a simplex set. Various testing and protective devices were also shown. The supplies and construction material included samples of Waterbury wire and cable, Universal storage battery, both glass jar and portable types, battery boxes and Matthews specialties. The company's representatives in attendance were Mr. Howard E. Merrell, Mr. Chas. N. Sigison, treasurer, Mr. W. E. Harkness, assistant general manager, Mr. W. L. Cook and Mr. Edward E. Backus, New York.

Railway Telegraph and Telephone Appliance Association.

The Railway Telegraph and Telephone Appliance Association held its annual meeting at the Hotel Brunswick, Boston, June 27, and elected officers as follows:

A. P. Eckert, New York, Chairman; J. J. Ghegan, New York, vice-chairman; W. E. Harkness, New York, secretary-treasurer.

Executive Committee: Messrs. H. E. Merrill, New York; H. O. Rugh, Sandwich, Ill.; W. F. Crowell, New York; W. H. Graffis, Chicago; E. E. Hudson, Orange, N. J., and H. P. Kimball, New York.

Messrs. R. A. Paterson and G. K. Heyer, of New York, and J. M. Lorenz, of Chicago, were appointed a committee to confer with a like committee of the Association of Railway Telegraph Superintendents to make suitable arrangements for accommodations, exhibits, etc., at the next convention.

The association now has a membership of thirty-five.

Mr. W. C. Muir, general superintendent of the Canadian Northern Telegraph Company in renewing his subscription says: "My experience with TELEGRAPH AND TELEPHONE AGE is that it contains a lot of valuable information, and for this reason I have decided to place the publication in the hands of some of our officials as per enclosed list."

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The Turner Monument Fund Closed.

Through the generous aid of Mrs. E. H. Harriman, wife of the late E. H. Harriman, the Turner Monument Fund has been closed, and active preparations will now be made to carry the project into execution.

Following is the correspondence bearing on the subject:

JERSEY CITY, N. J., JUNE 22, 1911.

MRS. E. H. HARRIMAN,
Arden House, Arden, N. Y.

Dear Madam: The Association of Railway Telegraph Superintendents and the Old Time Telegraphers and Historical Association, through their committee having in charge the project of erecting a handsome tablet at Harriman station, commemorative of the introduction of the telegraph in railway service, begs leave to solicit your aid in the matter. The committee has already collected a fund of $1,700, which will defray the expense of the tablet and the printing of a souvenir booklet containing a story of the events leading up to Mr. Minot's innovation in railroad operation, as well as an account of the dedication ceremonies and a list of the names of the subscribers to the fund, a copy of which will be sent to all subscribers.

It is desired to procure native stone, as a support for the tablet, and the committee presumes to ask you to contribute the stone from your premises and the necessary cutting to prepare it to receive the tablet. The stone may be in several sections. Full working plans for the cutting will be furnished by the committee.

The general design of the monument indicates the first telegraphic message sent by Professor Morse from Congressional Hall in Washington, to Baltimore, reading "What hath God Wrought," cut in the stone. All the other lettering will be placed on the bronze tablet. There will be shown in the maze of the lettering a reproduction of the original poles, insulators, brackets, switchboards and instruments used by Mr. Minot at Harriman station in 1851. There will also appear a bas-relief of Charles Minot. On the margin or frame of the tablet will appear the usual decorations, illustrative of Light and Wisdom, intertwined in a maze with the tools used by the telegraph linemen. In other words, it will be a distinctively telegraph monument, the only one of its character in the world, and a very interesting and decorative adjunct to the beautiful station grounds.

You will please pardon this intrusion, but the committee feels that you are interested in such matters and they have undertaken to give you a pen picture of the monument as it will appear when completed, hoping that it will appeal to you as worthy of consideration and receive your approval.

We might add, for your information, that the project has received the endorsement of Mr. F. D. Underwood, president of the Erie Railroad, Mr. Andrew Carnegie, Mr. Thomas A. Edison, and many other prominent railroad and telegraph men, who have favored us with liberal contributions.

I am, most respectfully,
Yours truly,
(Signed) E. P. GRIFFITH,
Chairman.

ARDEN, N. Y., June 23, 1911.

MR. E. P. GRIFFITH,

Dear Sir: I have received your interesting letter about the telegraph monument to be put up at Harriman station commemorative of the introduction of the telegraph in railway service. I will be glad to assist in any way possible and will provide the stone as you suggest and the necessary cutting.

Will you please send the full working plans for the support for the tablet to Mr. C. T. Ford, Central Valley, N. Y. He, being my superintendent, will co-operate with you in every way desired.

Hoping to hear that this project will be put through promptly and successfully, I am,

Yours sincerely,
MARY W. HARRIMAN.

JERSEY CITY, N. J., JUNE 24, 1911.

MRS. MARY W. HARRIMAN,
Arden House, Arden, N. Y.

Dear Madam: Your very kind letter of the 23rd instant, in reply to mine on the subject of a telegraph monument at Harriman Station, is received Your prompt and most generous aid, I assure you, is appreciated very much by the two Associations I represent.

You have enabled us to bring the project to a successful conclusion, and our thankfulness is beyond measure.

Yours very truly,
(Signed) E. P. GRIFFITH,
Chairman.

In accordance with this correspondence Mr. E. P. Griffith, chairman of the Turner Monument Fund Committee made the following report at the Boston Convention of the Association of Railway Telegraph Superintendents:

Mr. President: Your committee, appointed at our last annual convention, at Los Angeles, Cal., for the purpose of collecting a fund to erect a monument at Turner, N. Y., station, in commemoration of the first train order issued by telegraph, takes pleasure in reporting that the responses to the committee's appeals have been most generous and through the aid of Mrs. E. H. Harriman, of Arden, N. Y., who has contributed the necessary stone and the cutting of same, we are able to report the matter closed.

We would recommend that this association be represented at the dedication of the monument this fall by a large delegation and that the president appoint a large committee for that purpose.

Yours truly,

E. P. GRIFFITH, J. B. TALTAVALL, C. SELDEN, E. A. CHENERY, W. J. CAMP, W. B. WILSON, F. J. SCHERRER.

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Mr. Charles Heck, the noted sculptor of New York, has prepared plans for the monument and submitted sketches to the committee in charge of the matter.

Contributions received up to date are as follows: Previously acknowledged, $1,607.25; J. F. Mackie, Chicago, Ill., $2.00; F. S. Work, Warwick, N. Y., $5.00; J. T. Nolan, Washington, D. C., $2.00. Total, $1,616.25.

Physiological Effects of Electric Shock.

The chief causes of death from electric shock, say Drs. Krida and Stanton, in the New York State Journal of Medicine, are undoubtedly "fibrillary" contractions of the heart and respiratory paralysis. By the former are meant incoordinate contractions of the individual muscles of the heart resulting in complete derangement of its normal rhythmic beat. Respiratory paralysis seems to be identical with the results of an overdose of an anæsthetic. Respiration may continue, and consciousness be preserved, in cases of fibrillary contractions, till anæmia of the nervous system causes death, but, if the action of the heart be unimpaired, respiration can frequently be artificially restored. As yet there is no known reliable means of restoring the normal action of the heart once it is deranged; on the other hand, if the respiratory organs are alone affected, prolonged artificial respiration enables a considerable percentage of recoveries from apparent death.

The conflicting results reached by many investigators, as to the physiological effects of electric currents, are chiefly attributable to the different forms of current employed and the diverse experimental conditions. The following remarks apply to cases of shock from circuits carrying amounts of energy such as are used in ordinary commercial work. The current passing through the body of the victim probably varies between ½ and 10 or more amperes.

The effects produced by direct and alternating currents vary directly with the current strength (and hence with the applied voltage), with the duration of contact and with the path of current flow through the body. The frequency of alternating currents is of great importance, low-frequency currents being usually more dangerous than high-frequency currents of the same strength.

Paralysis of the heart is especially liable to result from low-pressure currents, particularly if the heart be in the path of current flow; respiratory paralysis, however, usually follows on anæsthesia of the central nervous system set up by high-pressure currents. Actual destruction of tissues by burning occurs only at the site of high-resistance contacts, and is of minor importance as a cause of death; nevertheless the tissues often slough far beyond the apparent limits of the burn. In cases of accidental shock, the body often serves merely to complete the path of a high-pressure arc.

In general the lower animals are more susceptible than human beings to electric shock. Whereas 70 volts direct current is often fatal to dogs, 100 volts scarcely affects a normal man, 200-400 volts produces muscular cramp, and 550 volts produces almost instantaneous respiratory failure. Low-pressure alternating current shocks are liable to cause fibrillary contractions; 600 volts causes fibrillations and respiratory paralysis, but 2300-4800 volts usually affects respiration alone (in such cases artificial respiration should be persevered with, for hours if necessary). The medical reports of the electrocutions in the United States since 1890 show that a few seconds' flow of 2 to 7 amperes (at 1500 volts, 15 to 50 cycles per second) may not cause death, but with an application of 45 to 50 seconds' duration, the heart's action is permanently suspended.

Lower Cable Rates Discussed at London Conference.

The subject of cheaper cable rates was discussed at the meeting of the Imperial Conference at London, on June 15.

Sir Joseph Ward, Premier of New Zealand, said there was a feeling in the overseas countries that the present rates were due to a ring or combination in the cable world, and Sir Wilfrid Laurier of Canada pointed out that all the trouble which existed at present was in connection with the Atlantic cables. There was, he said, an impression amounting almost to conviction in Canada that a combination existed with regard to the cables.

Postmaster General Herbert Samuel supported a resolution to the effect that it was desirable to obtain a reduction of cable rates throughout the British Empire. After referring to the consent of the principal Atlantic cable companies to a reduction of 50 per cent. for deferred dispatches and expressing hope that with the approval of the foreign administrations interested new rates would shortly be introduced, he announced that steps were being taken with a view to obtaining a reduction of press rates.

After a discussion of the question of nationalizing an Atlantic cable with the object of cheapening rates to Australasia, Mr. Samuel suggested that in view of the probability of a reduction in rates the government would not at the present time be justified in undertaking a large capital expenditure and the risk of loss that would be involved, but he moved a resolution, which was passed unanimously, "that in the event of considerable reductions in transatlantic cable rates not being effected in the near future, it is desirable that the laying of a state-owned cable between England and Canada be considered by a subsidiary conference."

Mr. S. L. Robinson, an old-time and military telegrapher and for years prominent in Chicago telegraph circles in renewing his subscription for another year writes: "While out of the way somewhat up here in northern Michigan, the AGE keeps me in touch with my old associates in the telegraph world and refreshes in my mind pleasant memories. It is very welcome."

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The English State Telephone Service.

Replying to criticisms of the project to take over the National Telephone Company's system by the English government, Hon. Herbert Samuel, the British Postmaster-General, said that he failed to see why a private company could operate the telephone system cheaper than could the government, as the money borrowed by the government for the enterprise only paid 3 per cent., while the independent company would have to borrow it at a higher rate. He stated that the government could easily make the telegraph pay at any moment by ceasing to provide telegraphic facilities in rural districts and by abolishing 12-cent telegrams. The lack of efficient service in foreign government systems he stated, was a fault of the service and not of the principle.

Telephone Numbers.

Speaking of telephone numbers, says Ellis Parker in *Judge*, a good number for a cigar dealer would be 2-4-5, and a cheap suburban sport might as well be 4 Flushing as anything else. An Irishman wishing to dine would naturally call up a place 2-8, but a Hinglishman 'aving to call up a blarsted, bloomin' creditor regarding a bill would be '8-2.

A lover ordering a chair would want 1-4-2, and a newly wed couple wishing a flat would want 1-4-2-2, but the German maiden refusing to marry would shout 9-9-9-9. (Oh, how clever!)

If you want to borrow you wish 4-2-0, and probably that is a money lender's number, but if you only want a small loan from a friend you will wish 2-0-5. (That's pretty cute. What?)

The bookmaker should have two 'phones—9-2-1 for long shots and 4-2-5 for favorites. The man with a dog might call 6-6-6-6 (get that?)—and the farmer should put 8-0 on his list. (Put-eight-o, hey, what! I rather guess that's a rotten potato!)

If two horses were in the running and 1-1-5-0 John he would be a happy lad and his smile would be 2-2 Broad. (This is one I 8-2 Spring on you.) And if John spent the cash for liquor I would cry 5-5-5-4 John! But that is just how careless John is. His drinking is hades for his wife, but it's 7-4 John. (What, ho!)

(Honestly, I could keep this up all night!) If two of you wished to be wed you would not have 2-8-4 Spring, because you could call 4-1 Rector to make you one immediately, and then, if tired of being united in one, you could go to a fat judge and let that 1-2 Broad-party-W again. (If you can't see that, ask for information.)

The Brown Telephone Relay in Wireless Telegraphy.

In our issue of March 1 we referred to some experiments made by G. W. O. Howe, assistant professor of electrical engineering at the City and Guilds College, South Kensington, England. The Brown telephone relay played an important part in these experiments and very materially increased the sensitiveness of the receiving equipment.

The aerial at the college consists of a single wire of No. 14 gauge suspended between a chimney stack on the college and the tower of the Imperial Institute. The length of the span between the chimney and the tower is about 530 feet, the upper end being about 260 feet from the ground and the lower end 100 feet. When a Brown telephone relay was introduced between the detector and the telephone receiver signals from Glace Bay, N. S., could be distinctly heard at night, whereas before the insertion of the relay it was not possible to pick up the signals. The aerial is connected through a variable inductance to a transformer with variable coupling. The circuit of the secondary winding of the transformer includes, in series, a zincite-pyrites detector, a variable inductance and the Brown relay, two condensers being bridged across the circuit, one on each side of the detector. With this arrangement the telephone responds so loudly that signals from the Eiffel Tower in Paris and the Norddeich station in North Germany can be heard distinctly all over the large lecture theatre of the college.

Use of Telephone in Surgery Probing.—One of the latest applications of the telephone is its use in surgical work in probing for bullets and other metallic substances in the body. The device is described at length in the *Medical Record* by Dr. William S. Thomas of St. Luke's Hospital, New York. In the search for metallic substances in the body, such as pins and needles, the fine points of the telephone searcher are made to traverse the tissues where the foreign matter is concealed. The general location of the troublesome substance is at first determined by an X-ray photograph. The probe consists of three parallel needles insulated from one another on a handle, and each is connected with the wire of a three-conductor cord. The conductors are connected with a battery and a telephone receiver in such a way that when metallic contact is made with any two of the three points the operator gets a sound through the receiver clasped to his head. Once the grating is heard the operator turns off the switch in order to prevent heating at the point of contact by the electric current. The searching needles are left in position and the surgeon cuts down to where the foreign substance is indicated and removes it.

Mr. A. B. Cowan, commercial superintendent of the Western Union Telegraph Company, Chicago, Ill., in remitting to cover the renewal of his subscription for another year, writes: "I cannot get along without the Age, and wish every man in the telegraph business felt as I do about it. I take every opportunity to recommend it, and see a great many more studying it now than in days gone by. I believe more of the operators are beginning to realize the necessity and advantages of study, and as a consequence in a few years the telegraph service will be on a higher plane than ever."

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Lightning Arrester.

The lightning arrester shown in the accompanying illustrations offers a new electrical principle

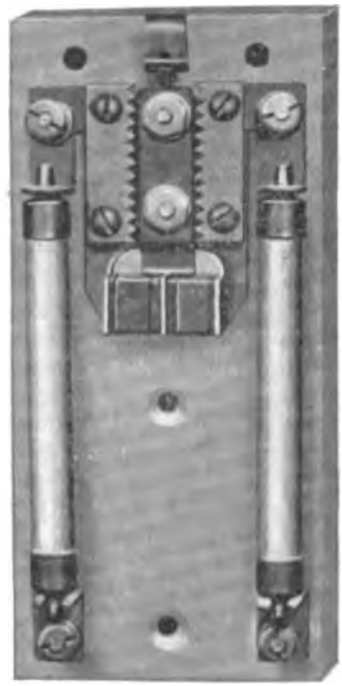

FIG. 1.—NON-AIR GAP LIGHTNING ARRESTER.

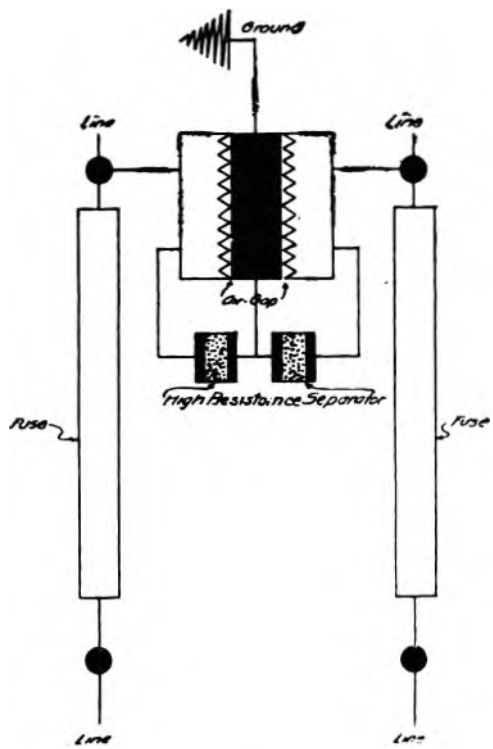

FIG. 2.—DIAGRAM SHOWING CONSTRUCTION OF LIGHTNING ARRESTER. STATIC OR INDUCTIVE DISCHARGES PASS THROUGH HIGH RESISTANCE SEPARATORS. DYNAMIC CROSSES OF 500 VOLTS OR OVER JUMP AIR GAP.

in protection and is the result of a combination of the non-air-gap lightning arrester with a standard telephone type. This combination does away with dusting or fusing of the arrester after lightning storms. Instead of the arc passing across an air gap, causing the metals or carbons to fuse, the discharge is absorbed by a high resistance block between line and ground. The block is of a special material, highly sensitive to static currents but of great ohmic resistance and of constant value. It will not fuse and will permit no leakages of current. The air gap is not done away with as that feature is provided to allow a potential of 500 volts or over to break down and ground thereby protecting the line from crosses with trolley wires or other high potential circuits. The arrester is extremely simple and neat. It was introduced by the L. S. Brach Supply Company, New York, some time ago, and many thousands of them are now in successful service in all parts of the country on signal, telephone and railway telegraph lines.

The anti-dusting lightning arrester is built to conform with the requirements of the National Board of Fire Underwriters and every arrester is tested for efficacy. The capacity of discharge is very great and the arrester is said to be more sensitive than any air-gap type as the resistance blocks themselves are capable of shunting an arc from an air gap of four one-thousandths of an inch in thickness.

Lehigh Valley Installs Telephone Yard Dispatching Circuits.

To expedite the work of handling trains in and about its Jersey City yards, the Lehigh Valley Railroad has applied to terminal operation the methods already employed in dispatching scheduled trains. A telephone system under the supervision of the general yard master, with telephone lines extending to every coal pocket, freight house, yard office, switch and other point with which he is required to keep in touch, has been installed. Western Electric selectors and telephones, with which the rest of the Lehigh Valley's extensive dispatching system has been equipped, are being used. Special equipment was designed for this system.

Telephone Train Dispatching.—The Western Electric Company has just issued a large folding sheet entitled "Our Contribution," which tells its story in pictures. It contains views of the company's train dispatching telephone equipment designed for every requirement of steam and electric railway systems. It also shows views of dispatcher's offices on various prominent railroads using the company's system of telephone train dispatching. It is an interesting record of the work done in this direction.

Hall Signal Company Reorganized.—The Hall Signal Company, at Garwood, N. J., has been reorganized.

Any book on electrical application can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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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.]

(47) Q. Has the force of gravity ever been utilized as an aid in the operation of telegraph instruments? It has occurred to me that it might be applied and utilized to good advantage in the construction of apparatus. T. C. O.

A. The force of gravity has been used in this way in the Horton repeater. The bases of the relays are higher at one end than at the other thus throwing the armature lever out of plumb, the force of gravity taking the place of a spring in holding the front contact points closed.

(48) Q. What is a "booster" and what are boosters used for in connection with storage batteries? C. I.

A. A "booster" is a special generator of smaller size than the main generator and is used for automatic control in charging and discharging storage batteries. Boosters are usually driven by direct-connected electric motors.

(49) Q. Is there any advantage in a wireless transformer over an induction coil in the operation of wireless telegraphy? W. T. A.

A. In some respects there is. The strength of the secondary current of a transformer is so much greater than that of an induction coil that more powerful and penetrating waves are developed. On the other hand the secondary of a wireless transformer seldom develops potentials greater than 15,000 to 20,000 volts, while those of an induction coil range from 15,000 to 300,000 volts.

(50) Q. Is sparking at the brushes of generators injurious to the commutator? R. A.

A. Much depends upon the amount of sparking. If it is moderate no harm will result, but if it becomes sufficient in amount or in duration to blacken or roughen the commutator bars, it should be removed as much as possible. The small white sparks along the edge of the brush usually do little injury, but the large ones, appearing at irregular intervals, and with a hissing sound and greenish hue, are more serious. Sparking is not desirable under any circumstances.

(51) Q. Will you please give instructions for the balancing of the quadruplex? Quad.

A. To give these directions in this column would require considerable space. Full instructions for balancing are given in Mr. Jones' book of diagrams and information, and several articles on this subject have been published in recent issues of this paper. The price of Mr. Jones' book is $1.50 per copy.

(52) Q. Please give me the rule to determine the joint resistance of two or more wires. P. G. M.

A. The rule is expressed in the formula, $\frac{R \times R'}{R + R'}$ that is, the joint resistance of two or more wires is equal to the product of the separate resistances divided by the sum of the separate resistances. Thus, giving the letters numerical values, as for example,

$$\frac{20 \times 75}{20 + 75}$$

and performing the operations indicated we have 15.79 as the answer. An easy method of determining joint resistance was published in our issue of February 16 this year.

Outing of Postal Branch Managers.

The fourth annual outing of the branch managers of the first district, Eastern division, of the Postal Telegraph-Cable Company, was held at College Point, Long Island, Saturday, June 24.

The party, numbering 253, the largest gathering in the history of the association, was conveyed to College Point on the steamboat *Orient*, which was chartered especially for the occasion.

There were several races and a baseball game, all of which were hotly contested. Valuable and handsome prizes were awarded to the successful contestants. The fifty-yard dash was won by T. Rahtes; second, Frank Tierney.

The quarter mile handicap run was won by F. Woessner; second, John Henry.

The Fat Men's Race was won by T. J. Donovan; second, J. Hefferman.

The fifty-yard potato race which occasioned much merriment was won by P. Gallagher; second, J. McCauley, and the three-legged race by a team composed of Becker and Eldred, E. Rahtes and Geo. Young finishing second.

The game of baseball was between the general office operators and the branch office men, and was won by the general office operators, the score being 12 to 8. Individual prizes of pearl-handled pocket knives were presented to the winning team.

The walking contest for men in the service over twenty years, which replaced the bowling, was won by Phil. Hickey of the Cotton Exchange office.

In addition to the events originally planned there were the broad jump and shot put for men in the service over twenty years, the former being won by S. E. Ostrom, with W. Finley second; the latter by C. A. Francis, with Chas. Ruffer second.

Mr. C. F. Leonard, district superintendent, New York, was the judge in the contests and he acquitted his delicate duties in a very praiseworthy manner.

Dinner was had at 6:30 p.m., after which the prizes were distributed to the winners of the afternoon contests. The surprise of the evening came when City Manager E. P. Tully arose and with a speech expressing the respect and love in which the association held their superintendent, Mr. C. F. Leonard, presented that gentleman with a large and handsome silver loving cup inscribed:

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Presented to Christopher F. Leonard
As a token of love and esteem from the
Branch Managers' Association
First District, Eastern Division
Postal Telegraph-Cable Co.
June 24th, 1911

Mr. Leonard responded feelingly, and cordially thanked the members for their good will and thoughtfulness.

An interesting vaudeville entertainment followed and the party returned to the city at 10 p.m. highly pleased with their day's outing.

Following is the list of the officers and committees:

E. P. Tully, Chairman; W. F. Finley, Secretary; H. Zweifel, Treasurer.

Reception Committee.—J. Hennessy, Chairman, J. McCauley, J. Shandley, M. F. Geigle, D. Sullivan, H. J. Reinhardt, J. H. Flood, F. G. Payne.

Committee of Arrangements.—S. E. Ostrom, Chairman, J. F. McNeill, J. A. Manning, H. Weise, C. A. Francis.

Field Committee.—J. J. McDermott, Chairman, T. J. Donavan, T. E. Heffren, T. J. McQuillan, J. Leahey, F. W. Daly, J. F. Tynan, J. J. Alcock.

The success of the affair was unbounded and much credit is due the officers and the various committees for the able manner in which they exercised their duties.

T. M. B. A. Assessment.—Assessment No. 525 and 526 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Horace N. Howell at East Andover, N. H., David R. Downer at East Orange, N. J., Alice M. Walker at North Wilmington, Mass., George H. Schnitgen at Clinton Corners, N. Y., George G. Peckham at Blue Grass, Ia., William H. Barrett at Hugo, Okla., William H. Chisholm at San Francisco, Cal., James H. Rooney at New York, N. Y., Frank P. Burke at New York, N. Y., William A. Dunn at Baltimore, Md., John E. Davhoff at Pasadena, Cal., Robert B. Welch at Woodstock, N. B.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

In a baseball game on Staten Island, June 17, the Executives beat the Supply Department team 31 to 7. The victors will play a game with the Operators' team at the Morse Electric Club outing at College Point, L. I., on July 8.

Mr. J. C. McGrew, manager of the Jamestown, N. Y., office has been promoted to the managership of the Erie, Pa., office, vice George F. Stadtmiller, appointed district commercial manager with headquarters at Jamestown.

PHILADELPHIA, POSTAL.

General superintendent Mr. E. B. Pillsbury recently visited this office.

Cashier Mr. J. H. Wilson is enjoying a well-earned vacation at the seashore.

Lineman Chas. H. Robey, for many years stationed at Conowingo, Md., was found dead in his barn June 9, having taken his own life.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

FOR SALE—A Bunnell galvanometer, complete in leather case, with resistance coils and connections for Wheatstone bridge measurements. Must be disposed of immediately to close an estate. Cost over $100.00. Will sell for $35.00. Address "Galvanometer," care Telegraph and Telephone Age, New York.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, combines fraternalism with sound business principles; it offers to the telegraph and telephone employe an absolutely safe form of protection, at a cost within the reach of all and lower than can be found elsewhere. Membership is only open to employes in commercial or railroad telegraph or telephone service, and it is manifestly to the interest of those who are eligible and wish to secure life insurance within their means, to secure without delay a certificate for $1,000 or $500, or both, at rates based on present age.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 14. NEW YORK, JULY 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

SELF-ADJUSTING RELAYS.

A correspondent writes as follows:

"I notice that single line relays, sounders, and in fact practically all electromagnets used in the telegraph service today are constructed and adjusted by hand in the same way Morse adjusted the first instrument. Now and then I hear of self-adjusting relays, but evidently none of them was satisfactory or it would have been adopted. Can you give us some idea as to what has been done in the way of attempts to invent a practical self-adjusting relay and why every inventor has apparently become discouraged?"

Such an instrument is certainly well worth striving for and the lucky successful inventor would undoubtedly reap a rich financial reward. However, no one has so far succeeded in constructing an instrument of this kind that has filled all requirements with any degree of satisfaction. The whole trouble, in a nutshell, is that the proposition calls for an instrument which, unaided by human intelligence, is required to pit its necessarily permanent or fixed value of retractile spring strength against that of variable force exerted by opposing electromagnetic influences.

For instance, the tension value of the retractile spring is normally a fixed quantity, so to speak, while the magnetic or opposing influence fluctuates in value with every alteration in the volume of current flowing through the coils and line.

There have been many different methods suggested and tried to compensate for alterations in the line current, among which were attempts to accomplish the purpose by placing the armature between the polepieces of two separate magnets, one much stronger than the other, through the respective coils of which the line current flowed in series. The assumption was that any alterations in the current which might develop would not affect the normal working of the armature because the magnetic strength of the two magnets would increase or decrease in the same ratio on each side of the armature.

Obviously this method was unsatisfactory, first, because it required a greater current to offset the back pull, and also because the tension of the retractile spring being still a factor of fixed value did not alter proportionately with the electromagnetic forces created. For this reason the tension spring remained as obstructive in character as ever.

Another method tried was that of connecting a polarized relay in series with the secondary winding of an induction coil through the primary of which the line current flowed. Its operation depended upon the principle that a rising current in the primary will cause the current in the secondary to flow in one direction and a diminishing primary current a secondary current in the opposite direction. When one opens a key in the line on a wet day he decreases the current, even though he may not remove all of it, yet the action is sufficient to throw the lever of the polarized relay over to the "open" local contact point where, of course, it remains until the current of opposite polarity is generated by the closing of the key. As a polarized relay responds to direction of current only, that is, changes of polarity, it follows that the volume of the current is not so important a consideration as are the reversals of polarity. Changes in volume due to wet weather are not rapid enough to affect the armature, hence a readjustment is not required. This relay, however, also proved inadequate. The method was attractive in theory and workable on non-inductive circuits, but was unsatisfactory on long external circuits, subjected to strong inductive influences. Owing to the great sensitiveness of the relay such influences tended to cause the lever to vibrate thus preventing stability of the local contact points.

The latest and probably the most promising self-adjusting relay was that described briefly in the June 1 issue of this journal. We say "promising" because the method is the first we have heard of which endeavors to alter the tension of the retractile spring simultaneously with the fluctuations in the strength of current. Not having seen the apparatus we can only say roughly that this is ac-

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complished by giving the armature an angular twist which in turn causes the lever and contact points to move bodily into a position where the tension of the spring and magnetic strength of the relay are nearly balanced.

There are, of course, other features in this relay which we have not touched upon, as there are in the previous methods referred to. The point we wish to make, however, is, that there is no use giving up the hope of finally succeeding. Each move in a new direction suggests something else. Some one will no doubt yet solve the problem.

Recent Telegraph and Telephone Patents.

ISSUED JUNE 20.

995,588. Electric Wave Transmission. To J. H. Cuntz, Hoboken, N. J.

995,619. Selective Signaling Apparatus. To I. F. Manny, Milwaukee, Wis.

995,849. Signaling Device for Telephone Systems. To A. J. Dunton, Ketchikan, Alaska.

995,924. Telephone System. To J. B. Stemm, Chicago, Ill., and G. E. Slade, Brookfield, Mo.

ISSUED JUNE 27.

996,088 and 996,089. Combined Wire and Wireless Telephone System. To M. B. Johnson, San Antonio, Tex.

996,090. Wireless-Telephone System. To M. B. Johnson, San Antonio, Tex.

996,092. Box for Carrying Wireless Signaling Apparatus. To M. B. Johnson, San Antonio, Tex.

996,143. Common-Battery Lock-Out Telephone System. To H. J. Roberts, Evanston, Ill.

996,391. Reinforcer for Telephone Circuits. To E. F. W. Alexanderson, Schenectady, N. Y.

996,445. Telephone Relay and System. To E. F. W. Alexanderson, Schnenectady, N. Y.

Personal.

Mr. Thomas A. Edison has been elected an honorary member of the Automobile Club of Paris.

Colonel Robert C. Clowry will sail for Europe on the steamer *Oympic*, on July 26, to be absent two months.

Mr. Melville E. Stone, general manager of the Associated Press, New York, has received the degree of Doctor of Laws from Wesleyan University.

Major Joseph Orton Kerbey, an old-time and military telegrapher, and ex-consul of the United States to Brazil, has returned from a trip to the Amazon country in Para, Brazil.

Mr. C. H. Murphy, general superintendent of time service, New York, is the subject of a biographical sketch in the Cedar Rapids, Iowa, *Saturday Record*, of July 8. Mr. Murphy is well-known in Cedar Rapids.

Mr. Frank B. Knight, the well-known old-time telegrapher and now special agent in charge of publicity, Southwestern Telephone and Telegraph Company, Dallas, Tex., sailed on July 11, for Paris, where he will meet his daughter. Mr. Knight will return about November 1.

Mr. Ralph W. Pope, an old-time telegrapher and for the past twenty-six years secretary of the American Institute of Electrical Engineers has resigned and will, on August 1, become honorary secretary of that organization. Mr. Pope has been largely instrumental in the up-building of the Institute and has a wide acquaintance in scientific circles both at home and abroad.

Mr. Rupert F. Fry, a former telegrapher and a son of Mr. U. J. Fry, superintendent of telegraph, Chicago, Milwaukee and St. Paul Railway, Milwaukee, Wis., is president of the Old Line Life Insurance Company of America, Milwaukee. Mr. Fry organized the company in 1909 and it was chartered in 1910. It has had a very successful career and has over $1,000,000 insurance now on its books.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager is absent on a short sea trip to Nova Scotia, New Foundland and Montreal. He is accompanied by Mr. Theo. L. Cuyler, Jr., assistant treasurer.

Mr. Leona Lemon, division superintendent, New York, is absent on a vacation at Beach Haven, N. J.

Mr. D. McNicol of the electrical engineer's staff, New York, has returned from a vacation which he spent in Canada and in the Thousand Islands region.

Mr. D. H. Gage, jr., of the electrical engineer's department, New York, has returned from Dallas, Tex., where he has been for several weeks engaged in the work of establishing offices for the new Mackay Telegraph and Cable Company, in Texas, Oklahoma, etc.

Mr. S. J. Pickering, manager of the Lebanon, Pa., office of this company, has been transferred to Easton, Pa., as manager.

Mr. W. B. Stewart has been appointed manager of the Asheville, N. C., office of this company.

Mr. W. L. King, manager at Elmira, N. Y., and Mr. G. H. Mills, manager at Providence, R. I., were recent executive office visitors.

Mr. J. C. Carmody, manager of the Fitchburg, Mass., office of this company has resigned on account of ill health and has been succeeded by Miss Bertha M. Atkins, formerly assistant manager.

Telephone Lines on Postal's Poles.

The Postal Telegraph-Cable Company has decided to allow independent telephone companies to string wires on its poles on certain conditions.

The following instructions on the subject have been issued to all superintendents of the Postal system by Mr. E. J. Nally, vice-president and general manager:

"In order to increase our facilities and create a new source of income, our company has decided to make an offer to independent telephone companies of allowing them to string wires on our poles at

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the usual rental, varying, according to the different localities, from $4 to $6 per mile, per wire, per year, on the condition that we shall be allowed to composite their wires so strung on our poles where it will not interfere with their telephone use, and that we shall be allowed without charge to use the telegraph circuit whenever we wish.

"We have at various places telephone circuits which we can lease at once, and are willing to lease to responsible independent telephone companies. At other places we have copper wires which can be transposed, and we are willing to lease the telephone side of these wires. In all other places we are willing to string copper wires at our own expense, on our own poles, and lease the telephone side of the circuits to responsible independent telephone companies, provided; first, that the telephone company will in each instance contract to keep the lease for five years; and, second, provided that the wires will probably be of use to us upon the termination of the lease—in other words—between commercial centers."

Mr. Frederick W. Conger, division superintendent of the Mackay Telegraph and Cable Company, with headquarters at Dallas, Tex., is one of the most able and progressive officials in the company's service, and his recent transfer from the Postal Telegraph-Cable Company's service at Chicago to that of the recently organized Mackay Company at Dallas is indicative of the care exercised by the company in selecting officials to fill positions requiring ability and tact. Mr. Conger was born in Phœnix, N. Y., in 1855. He learned telegraphy on the Chicago and Northwestern Railroad in 1874 and entered the service of that company as night operator at Westside, Iowa. After serving as extra station agent and operator at nearly all stations between Boone and Council Bluffs for about two years, he became superintendent of telegraph of the Sioux City and Pacific Railroad. In October, 1878, he left this position and became train dispatcher on the Chicago division of the Illinois Central. In July, 1886, he was made chief clerk of the telegraph department and assistant to the superintendent of telegraph of that system, the late C. S. Jones, which position he held until he entered the employ of the Postal Telegraph-Cable Company as clerk in the Chicago office in 1893. He was subsequently appointed chief clerk in the general superintendent's office in Chicago, and in 1899 became superintendent of the same interests at Cincinnati, Ohio, holding this position until April, 1901, when he was advanced to the post of district superintendent at Chicago. In April, 1909, Mr. Conger was appointed superintendent of the western division with headquarters at the same point, which position he held until his recent transfer to Dallas for the Mackay company. Mr. Conger has charge of the Mackay company's lines in Texas, Oklahoma, etc., and is well fitted by reason of his large experience to conduct the affairs of the newly organized interests.

F. W. CONGER,
Division Superintendent Mackay Telegraph and Cable Company, Dallas, Tex.

Conference of Great North Western Telegraph 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, when a number of matters in reference to the service of the company were discussed. Mr. George D. Perry, general manager, presided, and among those present were Messrs. S. B. McMichael and D. E. Henry of the general manager's department, A. C. McConnell, secretary and auditor, W. J. Duckworth, superintendent of construction, A. R. Porte, superintendent, Ogdensburg, and managers George Hogarth, Toronto, L. S. Humes, Montreal, Charles E. Davies, Ottawa, C. E. Lillie, Quebec, J. Padington, Winnipeg, J. Jamieson, Hamilton, D. Adams, London, and C. E. McManus, circuit manager, Toronto. It was felt by those present that a great deal of benefit would result from the discussions, which were carried on in a most harmonious manner. The general manager entertained the party for dinner at the Royal Canadian Yacht Club, Toronto Island, and a most enjoyable evening was spent.

Mr. J. J. Barnett, manager, Postal Telegraph-Cable Company, Knoxville, Tenn., writes: "In short the TELEGRAPH AND TELEPHONE AGE gives 'value received' and hence it is always a pleasure to send you my renewal."

Mr. R. C. Bliss, manager Western Union Telegraph Company, Cincinnati, Ohio, writes: "Age improves some things and I am convinced that whoever gets the TELEGRAPH AND TELEPHONE AGE will improve."

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Western Union Telegraph Company.

EXECUTIVE OFFICES.

The degree of Doctor of Laws has been conferred upon Mr. Theo. N. Vail, president of the American Telephone & Telegraph Company and of the Western Union Telegraph Company, by Dartmouth College, at Hanover, N. H.

Mr. A. G. Saylor, general superintendent, New York, spent the Fourth in Maine.

Mr. W. E. Athearn, engineer of equipment, New York, is spending the summer at Martha's Vineyard, Mass.

Mr. W. J. Dealy, general superintendent of the Commercial News Department, New York, has gone to the Adirondacks to recuperate after his recent illness.

Mr. Owen A. Conner, manager of the Boston office of this company, was married in Brooklyn, N. Y., on June 21 to Miss M. K. Macdonald formerly of Chicago and for several years private secretary to Mr. E. M. Mulford, division commercial superintendent, New York.

Mr. Wm. E. L. de la Motte, for the past thirty-eight years manager of the Marine Observatory of the Western Union Telegraph Company at Sandy Hook, N. J., has retired from active service. He has been succeeded by Mr. E. Zilly who was for many years Mr. de la Motte's assistant.

Mr. E. Ford Collins for several years past manager of the Pittsburg office of this company has been appointed district commercial manager for the West Virginia territory with headquarters at Huntington, W. Va. Mr. Collins succeeds Mr. S. V. King who has returned to Charleston, W. Va., as manager.

Mr. S. V. King has resumed the position of manager of the Charleston, W. Va. office. He succeeds Mr. H. S. Barbee who has gone to Pittsburg for the same company.

Mr. J. H. Purnell for nearly half a century manager of the Opelika, Ala., office of the Western Union Telegraph Company has retired. He is succeeded by Miss Laura Newsome of Gibson, Ga.

Mr. George Heldorfer, manager of the Western Union Telegraph office at Burlington, Iowa, has resigned after a service of over forty-three years in that place.

Mr. J. C. Strickland has been promoted from the managership at Charlottesville, Va., to be manager at Petersburg, Va., vice Mr. P. L. Wilcox, who leaves the service.

Mr. A. B. Robinson of Wilmington, N. C. has been appointed manager at Charlottesville, Va., vice J. C. Strickland.

Mrs. A. P. Meade has been appointed manager of the Tuscaloosa, Ala., office of this company.

Mr. Frank U. McMullan, manager of this company's office at Greenville, Ala., has resigned after a service of fifty-five years.

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

The annual meeting of the Maine Telegraph Company was held at Bangor, Me., June 24. Directors were elected as follows: Mr. Theo. N. Vail, G. W. E. Atkins, A. R. Drewer, Belvidere Brooks and J. B. Van Every, of New York, and Charles E. Bliss and John Wilson of Bangor, Me.

The Western Union Telegraph Company has made application to the New York Stock Exchange for the listing of $1,877,000 5 per cent. bonds of the Mutual Union Telegraph Company. These bonds will mature in 1941.

Mr. J. C. McGrew whose appointment as manager of the Erie Pa., office of the Western Union Telegraph Company was announced in our issue for July 1, was born in Marietta, Ohio, November 28, 1882, and began his telegraphic career as operator at Mt. Clemens, Mich., in 1903. He afterwards occupied positions as operator at Parkersburg, W. Va., Cincinnati, Ohio, and Erie, Pa., and as wire and repeater chief at Butler, Pa., and at Wheeling, W. Va., which latter position he held for two years. He was appointed manager of the Jamestown, N. Y., office two years ago and held that position at the time of his recent appointment to the managership at Erie.

Meeting of Managers at Indianapolis.

A meeting of managers of the sixth district, Western Division, Western Union Telegraph Company, was held at Indianapolis, Ind., on June 28 last and was presided over by District Commercial Superintendent Mr. A. C. Cronkhite. The object of the meeting was to discuss the new routine for the purpose of forming plans for a concerted solicitation of business and exploitation of new features of the service. Among the managers present were: Messrs. P. L. Mounce, Indianapolis; R. E. Scorah, Terre Haute, Ind.; A. A. Burr, Richmond, Ind.; W. E. Jarvis, Muncie, Ind.; F. J. Rhorer, Marion, Ind.; Chas. Massena, Logansport, Ind.; Howard K. Armstrong, Anderson, Ind.; M. H. Hutton, Kokomo, Ind.; C. W. Mason, Marion, Ohio; F. W. Booher, New Castle, Ind.; J. E. Riley, Bloomington, Ind.; J. R. Sample, Bedford, Ind.; J. J. Lash, Columbus, Ind.; F. M. Andres, Peru, Ind.; W. W. Born, Kenton, Ohio; S. A. Rhodes, Bellefontaine, Ohio; J. P. Freeman, Frankfort, Ind.; C. E. Machir, Piqua, Ohio; M. A. Ryan, Urbana, Ohio; G. W. Morton, Sidney, Ohio.

District Traffic Superintendent Mr. A. A. Montgomery of Cincinnati, Ohio, was present and complimented the managers upon their splendid work. He urged the closest co-operation of the commercial and traffic employes and the necessity of constant supervision on the part of managers at offices where chief operators are not employed. Division Commercial and Traffic super-

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intendents M. T. Cook and W. J. Lloyd, of Chicago, offered words of encouragement and praise which added materially to the enthusiasm of the meeting. There are seventy-one offices in the district and it is proposed to hold other meetings until every manager has been given the advantage of attendance.

The Cable.

Mr. H. D. Windeler of the Commercial Cable Company's station at Canso, N. S., has been appointed superintendent at St. Johns, N. F., of the same interests.

The Commercial Cable Company's steamer, *Mackay Bennett* has completed the repairs to the cable between Port aux Basques, N. F., and Canso, N. S.

The French Telegraph Cable Company's New York employes held their annual outing on July 2 at College Point, L. I., N. Y. Mr. E. C. Sweeney, traffic manager, was the honorary president.

Obituary.

Mr. W. P. Scully, manager of the Western Union office at 91 Wall Street, New York, died on June 29.

Mr. W. N. Eastabrook, a prominent business man of Elmira, N. Y., and a former telegrapher, died in that city June 30 at the age of 64 years. He was a member of the Old-Time Telegraphers and Historical Association, and was one of the organizers and for several years vice-president and general manager of the New York & Pennsylvania Telephone & Telegraph Company, which afterwards passed into the control of the Bell interests.

The Telephone.

New Exchange in New Orleans.—The Cumberland Telephone and Telephone Company has opened a new exchange in New Orleans and it has been named the "Galvez Exchange" in honor of a former Spanish Governor of Louisiana.

The Telephone in Hot Weather.—During the recent hot spell the use of the telephone jumped to a high limit. Business men and subscribers generally preferred to transact as much business as possible by telephone rather than go out of doors, many merchants remaining at home.

Organization Changes in New York Telephone Company.—Mr. T. P. Sylvan has been appointed assistant to the vice-president of the New York Telephone Company, New York, his former position of special agent, commercial department, having been abolished. Mr. S. M. Greer has been appointed Metropolitan manager with headquarters at New York. Mr. W. W. Nicholson, division general manager, New York Telephone Company, New York, has resigned to become president of the Rochester, Syracuse and Utica Telephone Company. Mr. D. C. Cox has been appointed division general manager, Central Division, and Mr. H. W. Drake has been appointed division commercial manager, Long Island Division.

The Telephone Society of New York.—The 129th meeting of the Telephone Society of New York was held at the United Engineers' Building, June 20. Mr. P. O. Coffin, Auditor of Receipts, New York Telephone Company and the Bell Telephone Company of Pennsylvania and Controlled Companies, addressed the Society on the subject of "Plans and Aims of the Accounting Department." The retiring officers were unanimously re-elected, and these, with the Executive Committee, are as follows: President, E. S. Bloom, American Telephone and Telegraph Company, vice-president, D. C. Cox, New York Telephone Company; secretary-treasurer, T. H. Lawrence, New York Telephone Company.—Executive Committee, J. H. Colket, B. Foraker and J. C. Lynch, New York Telephone Company; W. J. Higgins, Western Union Telegraph Company; F. B. Jewett, American Telephone and Telegraph Company; C. A. Merrill, Western Electric Company.

Mr. Vail Favors Public Control.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, says:

"I am not afraid that the public will go far in an attempt to wrest from the corporations their rights.

"I am not afraid if a body representing the people and elected by them or else appointed by the President or by Congress, as the case might be, should take up the judicial problems which must be met by all great utilities, that they would suffer in consequence.

"What I am afraid of are the demagogues and unprincipled politicians who would have the people believe they are continually being cheated by the railroads and the gas companies and the telephone companies.

"It is from men of this class that I should like to see all power taken away. If the people themselves should obtain the right of control there would be no further cause for fear.

"Whether it would be possible under the present conditions and with the present state of interstate commerce laws to inaugurate a national utilities commission I am not prepared to say, but I believe this will be the ultimate solution of the problem. Perhaps in the beginning a State board would do this work much as the railroad commission does its work.

"Public control or regulation of public service corporations by permanent commissions has come to stay. Control or regulation exercised through such a body has many advantages over that exercised through legislative bodies or committees.

"The permanent commission will be a quasi-judicial body. It should be made up of members whose duty it will be and who will have the desire, the time, and the opportunity to familiarize themselves with the questions coming before them.

"It should act only after thorough investigation and be governed by the equities of each case. It would in time establish a course of practice and precedent for the guidance of all concerned.

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"Experience also has demonstrated that this supervision should stop at control and regulation and not 'manage,' 'operate' nor dictate what the management or operation should be, beyond the requirements of the greatest efficiency and economy.

"Management or operation requires intimate knowledge and experience, which can only be gained by continuous active and practical participation in actual working, while control or regulation can be intelligently exercised after judicial hearing by those who have not the knowledge or experience to operate.

"In other words the commission would be able to pass its judgment upon matters of justice and fairness rather than upon matters of technical detail, just as a judge altogether unacquainted with mechanics may hear a patent case and render a fair decision upon it.

"State control or regulation should be of such a character as to encourage the highest possible standard in plant, the utmost extension of facilities, the highest efficiency in service, rigid economy in operation, and to that end should allow rates that will warrant the highest wages for the best service, some reward for high efficiency in administration and such certainty of return on investment as will induce investors not only to retain their securities but to supply at all times all the capital needed to meet the demands of the public.

"Such control and regulation can and should stop all abuses of capitalization, of extortion or of overcharges and of unreasonable division of profits.

"It is largely the abuse by professional speculative promoters and swindling security vendors, mostly on a comparatively small scale, but not in any way associated or connected with the general business organizations or systems, that has been the cause of most of the popular odium surrounding the necessary machinery of business.

"It is conceded that as a rule private management is better, more economical and more efficient than public management and much more advanced and enterprising. The economical margin between public and private management has been shown by experience to be more than sufficient to secure the best private administration.

"When through a wise and judicious state control and regulation all the advantages without any of the disadvantages of state ownership are secured state ownership is doomed.

"State control of public utilities should not prevent progress, should be sufficiently unrestricting to encourage the introduction and demonstration of the value of any new or novel enterprise, and should allow sufficient reward for the initiative, enterprise, risk and imagination of the adventurers behind such enterprises.

"It should discriminate between the useful adventurers or promoters, pioneers in fact, and those pirates or sharks who on strength of other successes extravagantly capitalize undeveloped ideas and exchange the worthless securities for the savings of deluded and credulous investors. Corporate control and restriction should always exist to a sufficient degree to prevent such speculative promoting and such stock jobbing schemes."

The Nine Hour Law in Ohio.

One of the effects of the nine hour law in the State of Ohio is the throwing out of employment many of the women operators. In order to serve the public, the telegraph office must be kept open longer than nine hours and with women operators under the law this is impossible. It is the purpose of the telegraph companies to find employment for the women operators in other states as far as possible. In some offices they will be retained on a nine hour day, but it is said that as they will not be permitted to work overtime in the rush hours they will be replaced by men on whose working hours no time limit has been placed.

Telegraph Extension in China.

The Chinese telegraph administration, in view of the close working arrangements with the eastern extension, Australasia & China Telegraph Co. (Ltd.), British, and the Great Northern Telegraph Co. (Ltd.), Danish, has concluded an agreement with the two last-named companies whereby it is to receive an advance of $2,433,250 on the foreign traffic dues of the next eighteen years; that is, the two companies are to have as security a lien on the balances payable by them on the Chinese telegraphs under the joint-purse agreement of July 11, 1896. This agreement and, in fact, all other existing agreements and concessions between the administration and the companies were extended to December 31, 1930. It is stipulated that the money is to be utilized only for the development of telegraphs and telephones, and that the telegraphic charges on the land lines in China should be restricted to ten cents Mexican (4⅓ cents American currency) per word for all points within a province and 14 cents (6 cents American) per word between all points within two adjoining provinces.

Automobile Wireless Telegraph Plant.—The Austrian War Office has lately added an automobile wireless telegraph plant to the equipment of the Military Railway and Telegraph Corps. The wireless telegraph outfit, which is on the Siemens and Halske system, is carried on a special 28-32 h. p. chain-driven car. The petrol motor, which is provided with an automatic speed governor, is so arranged that it can be either connected up to the driving mechanism of the vehicle or coupled up to an alternating-current generator and a direct-cirrent exciter used in connection with the wireless telegraph installation. The mast is made telescopic, so that it can be carried on the roof of the car; when extended it measures 98 feet. In addition to the driver, accommodation is provided for six passengers.

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.

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Some Hints.*

BY W. J. CAMP, ELECTRICAL ENGINEER, CANADIAN PACIFIC RAILWAY COMPANY'S TELEGRAPHS.

Mr. Walstrum, the very persistent Chairman of the Topics Committee, requested me to write a paper for this annual meeting. I pointed out to him the fact that I am not qualified to prepare a paper which would really be of any benefit to this organization. I have at former meetings made some crude attempts, but the only reason why these were received with any attention was because I was fortunate enough to bring up subjects which happened to be of particular interest at the time. My papers were very incomplete, and were simply intended to induce discussion from which I would derive some benefit myself.

On looking over the minutes of previous sessions, I find that nearly every conceivable subject which can interest the members of this Association has already been thoroughly and ably written up, and there is really nothing left for me but to furnish some "hash."

INSULATORS.†

During the period from 1887 to about 1898, the Canadian Pacific Railway Company used white porcelain insulators on a portion of the long through wires. These were of German or British manufacture. An elaborate series of tests proved their great superiority over glass from a mechanical standpoint, the average blow necessary to break a porcelain being three times that required to break the glass insulator. It was also discovered that usually a porcelain insulator was only partially destroyed when hit by a stone and that the wire was not set free and remained fastened to each pole, but the glass insulator was so badly shattered that the wire would be freed and this frequently resulted in a cross with other wires which remained attached to the pole. This advantage was offset to some extent by the fact that, on account of the porcelain insulator being white, it offered a much better mark and was the one aimed at. The price of the porcelain insulator was increased until it reached about nine cents each laid down in Montreal, and its use by us, therefore, abandoned for some years. The glass insulator with which we were supplied then depreciated in quality, apparently on account of improper annealing, and appeals or complaints to the manufacturers resulted in no improvement; and, as the cost of the porcelain insulator was again very largely reduced, we have purchased nothing but white porcelain for the past three years.

Last year we procured porcelain insulators from Canada, the United States and Germany. One make turned out to have defective insulation properties, and we had a series of tests made comparing the three manufactures and glass. All of the insulators were of the same pattern and dimensions. One dozen insulators of each make, selected at random, were placed on pins in the open air, and frequent readings taken of insulation, humidity, temperature and barometer. During the tests the weather was of nearly every description, from dry cold to sleet, wet snow and rain. These tests proved that in every respect the German and United States insulators had from 5 to 10 times the insulating qualities of the Canadian and glass insulators, the two former giving practically the same results with a slight difference in favor of the German and the Canadian porcelain and glass almost on a par. Tests of wires after erection show the same differences.

TRANSPOSITIONS.

The first telephone dispatching circuit we installed was transposed every half mile. The selectors were in series, alternating on each wire. The circuit was found to be slightly noisy, and we then transposed it every quarter mile, which cut down the noise for a time, but we found it almost impossible to keep the circuit free from noise while working the selectors in series; and, as we found that most of the failures were due to the contact points of the relay, we changed from series to main line bridging selector without relay. Since then the circuit has been practically free from noise, and on all subsequent circuits installed the same method has been followed. We now transpose all our dispatching circuits every quarter mile, except where two circuits parallel each for a portion of the way. Over this section one circuit is transposed every quarter mile, and the other every half mile. Looking forward to the time when the telephone will be used for other work, we arrange transpositions on our copper telegraph wires (and sometimes on the iron), every half mile for the first pair, and for the second pair, every mile, or transposed at the quarter, three-quarter, and mile, skipping the half mile.

Our method of transposing when the two wires are on the same arm, is by the use of a curved iron bracket under the arm, and so placed that the wire it carries comes directly under the wooden pin carrying the other wire over the top of the arm. Where the two wires are on separate arms we place an extra pin on the upper arm half way between two of the regular pins, and skip the pin on the lower arm. By these methods we have largely decreased the liability of crosses in case of broken insulators.

LIGHTNING PROTECTION.

The problem of adequate lightning protection is a most serious one with the Canadian Pacific Railway on the portion of the line between Lake Superior and the Rocky Mountains on account of the excessive severity of the lightning in this district. If we use sufficient arresters to take care of the heavy discharges, we most likely will kill the telephone circuit by having so many "traps for bugs." We have been using in the stations where the telephone line is looped four Argus arresters, without fuses, on the four ends of the wires, and two Argus arresters with fuses on the bridge wires to the telephones and selector.

At stations where the circuit is only legged in we

*Paper read at the Convention of the Association of Railway Telegraph Superintendents, Boston, June 26-30.

†Valuable articles on Insulators were published in our issues of January 16 (page 85) and March 16 (page 235).

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have two Argus arresters with fuses. At the despatcher's office, besides the Argus arresters we equipped the first three poles from the office with O'Connell pole arresters. In some sections this protection seems to be adequate, the circuit being worked right through storms, but in the district mentioned it does not appear to be sufficient, my reports showing that at times the telephone has to be abandoned for an hour or more on account of lightning. There have been some interruptions on account of the pole arresters, and this year we are trying out another make of office and pole arresters to the same extent as the former equipment. Some of our superintendents have asked for pole arresters at every station, but I am afraid that if such were installed they would prove to be an endless source of trouble and annoyance, and that after every severe lightning storm, the circuit would be out of commission until a lineman could be sent over it.

TELEPHONE INSPECTORS.

On the Canadian Pacific system we have one telephone inspector for 250 to 300 miles of circuit with his headquarters approximately in the center. Up to the present we have not found it necessary to provide the inspectors with motor cars, but, personally, I believe that every inspector should have a light motor car, particularly in sections where there are comparatively few trains. Our inspectors are supposed to be continually on the move. I consider that an inspector's duty is not so much to remove interruptions, as to prevent them occurring.

TRAIN TELEPHONE SETS.

On every section where we install telephone train dispatching circuits, we equip every train with a telephone outfit, without selectors. The wrecking cars are provided with howler receivers, by means of which the dispatcher can call them in on the line if necessary. The connecting pole we use is the invention of Mr. J. F. Richardson, superintendent of telegraph of the Eastern division of the Canadian Pacific Railway. It is so arranged that connection can be made with any two wires on the line, no matter whether they are on the same arm or not. We do not install any equipment at outlying sidings as the train equipment answers every purpose should a train become stalled anywhere. On account of the severity of our climate during a portion of the year, no one could use a telephone at a pole box, and each outfit contains sufficient flexible twin wire to lead the circuit into the baggage car or conductor's caboose.

The Turin International Electrical Congress.—The International Congress of the Applications of Electricity, to be held in Turin, Italy, September 10 to 17, will be divided into eight sections, Section VI relating to telegraphy and telephony. Among the subjects assigned for discussion by invited speakers are: "Wireless Telephony," by V. Poulsen, of Denmark; Long Distance Wire Telephony," by F. B. Jewett, of the United States; "Automatic Telephone Exchanges as a Means of Economy and Improvement in Telephonic Communication in Large Cities," by H. Milon, of France; "Research on Secrecy in Wireless Telegraphy," by P. O. Pedersen, of Denmark; "The Various Systems of Multiplex Telegraphy," by W. A. J. O'Meara of England.

Resonators.

BY J. S. KNAPP, BUFFALO, N. Y.

I note the introduction of the new Western Union resonators and desire to say that while the metal support and its rigid base, together with the swinging arms, are a great improvement over former attempts at mounting resonators, it is unfortunate that in designing the wooden resonator no thought was apparently given to the production of a sharp clear sound from the sounder, which is of vital importance. As it now is the sound is deflected upward, entirely away from the ear. True, a part of the sound is heard, but much of it is not. It is bad enough when working on a duplex or quadruplex unincumbered by branch offices, but when one or more branch offices are cut in, they naturally draw so much current away from the main office sounder that the latter does not respond to an adjustment satisfactory to the receiver, especially be he slightly deaf.

Now, as everyone knows, when a cornet player for instance turns his instrument upward or away from an audience, the notes are mellow and in some cases extremely indistinct, while, when he points the bell of his instrument directly toward the audience, the full volume of the sound is readily heard.

The sounder has a brass base plate mounted upon a wooden surbase, to give it a clear sharp sound. Whichever way the full surface of this metal base is turned, that direction will give the greatest volume of sound; hence it will be readily understood that if it is so placed that its entire surface is turned toward the ear, very little sound will be lost and the ease of receiving will be greatly increased.

So much for the law of acoustics. Now let us take up the subject of gravity. Mounted as the sounders now are, with the armature in a horizontal position, gravity cuts but little figure, but to properly mount a sounder in a resonator to obtain the best results, it must be hung in the resonator box upon the end of the base, with its armature in a vertical position and the free end of the armature at the bottom. This will put the gravity pull in only one place, i. e., at the bar upon which the armature hangs. If mounted in the reverse position, it will be readily understood that the force of gravity will be exerted in three places, i. e., at the supporting points of the bar and it will also be endeavoring to pull or swing the armature either backward or forward during the time when the armature is exactly upon the center or when there is no magnetic pull from the sounder coils. Hence the proper position is as mentioned.

The resonator should be made of hard wood and should be built square, so that its four sides will throw the sound directly to the ear. This style

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of resonator can be readily mounted upon the new resonator arm at no more expense than the present "A" shape resonator.

Economy in the Telegraph Department.*

BY WILLIAM BENNETT, CHICAGO, ILL.

During these times when so much is being said about economy, efficiency and conservation of various forms of energy, it might not be amiss to consider some of the ways that savings may be effected in the telegraph department as related to other departments.

There are several methods: One is by cutting down the volume of business, which method is being adopted to some extent with more or less gratifying results. It has been demonstrated in some instances that the use of the telegraph service has been abused, and that many messages were sent by telegraph which could have been forwarded by mail, accomplishing about the same results. There is a question, however, about this system of saving, as there is no adequate method of determining where to draw the line and the elimination may be carried to such a point that the actual saving would more than be offset by losses sustained, due to delays. If the mail and wire messages could be classified so that the most appropriate service would be rendered, this system could be worked out very satisfactorily; but the business cannot readily be so classified and, consequently, there are objections to the method.

Another method has been considered: that is to close some of the offices and thus cut down expenses. There is always a question as to the wisdom of such a course, under ordinary conditions, as, while a saving may be shown in operating expense an actual loss may result in some other direction.

Another way that might be considered would be to reduce maintenance expenses either by increasing the line covered by a maintainer, reducing supplies, or employing less expensive material and labor. The methods, on the face of them, do not appeal to many of us as entirely practical.

I believe you will all agree that true economy along any line is that economy which utilizes to the fullest extent the facilities at hand and produces the best results at the least expense. The real question for us to consider then is, how may we increase the service rendered by the telegraph department without materially increasing the cost of operation or maintenance and, if possible, decreasing this cost. Obviously any method adopted to improve service will require some initial outlay; but, like the expense incurred in reducing grades, improving power, and increasing the load, this outlay ought to be considered in its true relation to the work accomplished and the ultimate saving effected, not perhaps in actual expense in the telegraph department but in expense to the railroad company as compared with the receipts made possible by the improved service.

There have been means adopted in the past for increasing the efficiency of telegraph lines, such as duplexing, quadruplexing, employing machine-telegraph apparatus and later the typewriter telegraph; but, as you all know, the greatest innovation in the telegraph departments in recent years is the use of the telephone and, as the current used for this service is so different in quality and kind from that employed for telegraphic purposes, the bringing in of this device has changed and many times multiplied the favorable results obtained by the department.

The use of train dispatching telephone systems of various kinds is the latest development and, while the first cost of an up-to-date train dispatching line, complete, is considerable, I believe you will all agree that the expense is justified and that the improved service resulting more than pays a good rate of interest on the investment, not considering the saving in operating expenses made possible by closing telegraph offices which are but little used, installing telephones at sidings and thus making it possible for the dispatcher to receive information from, and issue orders direct to the trainmen.

When we get our dispatching circuit working on busy divisions, there is usually a demand for a like message circuit. When a road has the dispatcher's line and the message line in service, it is obvious that the wires may be used not only for these two very efficient services but for other purposes. A large part of all dispatching and message circuits now in operation have been simplexed for through telegraph work and a simplexed line can be duplexed and in some cases has been successfully quadruplexed. There is some question of the advisability of quadruplexing these simplexed lines, however, as they can be made to render more satisfactory service by compositing them and using the composite for through telephone service between division points.

In some cases plans are being made to extend this class of service in a little different way; instead of simplexing both dispatchers and message circuits, it is planned to phantom the two circuits and simplex the phantom and then duplex the simplex.

A case of wire economy which may be of interest to you, as it was to me, is on the Evansville & Terre Haute line of the Frisco system, where, with two No. 9 B. & S. copper wires and two No. 8 B. W. G. iron wires, the following services are obtained:

An ordinary telephone train dispatching circuit with 29 regular stations.

A metallic block signal telephone circuit with 27 stations.

A through simplex telegraph circuit over the dispatcher's lines.

A local simplex telegraph message circuit with 29 stations over the block telephone circuit.

It was found in actual practice that it would not be

* Paper read at the Boston Convention of the Association of Railway Telegraph Superintendents, June 26-30, slightly abridged.

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practical to connect the thirty-six siding telephones on this division to the dispatcher's line. The business done from these telephones was of such a character and so great in volume that it would not be possible to issue all train orders if so much other business pertaining to occupied blocks, clear tracks, coal car orders and various other things were handled on the train wire. It was decided to connect these telephones to the block telephone circuits and have trainmen get their information from the block office; but another difficulty presented itself at this juncture: If the siding sets were not connected to the train wire, no train orders from the dispatcher's office could be given direct to trainmen at these points. To remove these objections the block circuits were so arranged that the block line (with whatever siding telephones might be connected to it) was connected through a repeating coil to the dispatcher's line; thus, while the dispatcher's line was relieved of the business of the siding sets, it was still possible when desired to connect them to the dispatcher's wire to receive important orders.

There are other features of interest on this division which show the extreme flexibility of the telephone system.

It might be worthy of note also to mention the fact that the through simplex telegraph circuit over the train wire is connected to a line running north to Danville and there through a repeater to the quad wire working into Chicago; also the local message telegraph circuit over the block wire works through to Danville over a local message wire.

Automatic drops are wired in the dispatcher's circuit so that if the bell rings at a station when the operator is out, the latter can readily determine this by glancing at his signal box when he returns. One telephone in such station performs all functions for both block and dispatcher's lines.

The only possible further service obtainable from these circuits would be a through grounded composite telephone from end to end of the dispatcher's line and in this case this might not be feasible owing to disturbances from surrounding wires. Now, doubtless some of us may be skeptical of the possibility of an ordinary lineman keeping a circuit of this kind in operation, but the reports are that the circuits are giving good satisfaction and the man who is maintaining them is the same lineman who has worked on their telegraph line for some time.

Now, in view of the extensive possibilities, increasing demands of traffic and the more or less increasing competition, true economy would appear to be for the telegraph departments to render all the service possible to both the passenger and freight traffic by all practicable means. Some of these means are utilizing the phantom telephone circuits or the message telephones for reservations, transfers, arranging to secure traffic, tracing lost shipments, and a hundred and one other things, which can obviously be done more expeditiously and economically by telephone and telegraph combined than by the telegraph alone. Considering all these facts is it not the truest economy to increase the service by increasing the utilization of present facilities, or even to increase the facilities rather than by cutting down the service to reduce the cost of operating the various departments?

Reunion of Old Timers and Military Telegraph Corps.

The thirtieth annual reunion of the Old Time Telegraphers' and Historical Association and the United States Military Telegraph Corps will be held at Atlantic City, N. J., September 5, 6 and 7. The headquarters will be at the Marlborough-Blenheim.

Following is the programme as officially announced:

Tuesday, September 5.—10:00 a. m.—Business meeting of the Old Time Telegraphers and Historical Association called to order by the retiring president, Mr. W. J. Lloyd, of Chicago. Address of welcome and response. Installation of the new President, Mr. W. B. Wilson of Philadelphia, Transaction of business, etc.—2:00 p. m.—Roller-chair trip. 7:30 p. m.—Business meeting of the United States Military Telegraph Corps. 8:30 p. m.—Concert and entertainment on Steel Pier.

Wednesday, September 6.—Morning—Ocean sailing. Afternoon—Trolley party to Ocean City. Evening—Concert and theatre entertainment on Million-Dollar Pier.

Thursday, September 7.—Morning—Ocean bathing. Afternoon—Go as you please. Evening—Banquet at the Hotel Shelburne.

The rates of the Marlborough-Blenheim are:

European Plan.—Single rooms without bath, one person, $2, $3, $4 per day; single rooms with bath, one person, $4, $5, $6; Double rooms without bath, two persons, $4, $5, $6; Double rooms with bath, two persons, $6, $7, $8.

American Plan.—Single rooms without bath, one person, $4, $5, $6 per day; single rooms with bath, one person, $6, $7, $8; double rooms without bath, two persons, $8, $9, $10; double rooms with bath two persons, $10, $11, $12.

Members desiring lower rates at other hotels can be accommodated by applying to the Chairman of the Hotel Committee.

The chairman of the various committees are: Mr. John Wintrup, reception committee, Old Time Telegraphers and Historical Association; Mr. Jesse W. Crouse, reception committee, United States Military Telegraph Corps; Mrs. Frank E. Maize, ladies reception committee; Mr. G. W. Deetz, Atlantic City, N. J., committee on hotels; Mr. John W. Reed, committee on badges; Mr. C. E. Bagley, committee on banquet.

Members who intend to be present at the reunion should notify the chairman of the hotel committee, Mr. G. W. Deetz, Western Union Telegraph Company, Atlantic City, N. J., as soon as possible, so that proper arrangements can be made.

It is possible that reduced railroad rates may be in effect from various sections in the country to Atlantic City during the time of the convention, and members who intend to be present at the meeting should make inquiry of their local railroad agent in regard thereto.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Associate Editor.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

July 16, 1911.

Old Timers and Military Telegraph Corps Reunion.

We print elsewhere in this issue the official programme of the joint meeting in Atlantic City, September 6, 7 and 8 of the Old Time Telegraphers and Historical Association and the United States Military Telegraph Corps. These veterans find much enjoyment at their annual gatherings which afford them opportunity of meeting old acquaintances and making new ones. It is a pleasant break in the monotony of the humdrum life lead by most of the members, who as they grow older are inclined to break away from the strain and excitement of modern life and turn towards the things that bring calmness and peace into their lives.

The United States Military Telegraph Corps is composed of a brave lot of men who won the highest esteem of the great army commanders for their bravery and intelligent work in the field during the war. They, too, with their old-time telegraph brethren are deserving of the enjoyment and recreation they get at these joint meetings, and everyone will wish them all a good time at Atlantic City.

Telegraph Engineering.

The awakening that is taking place in the telegraph in this country in its engineering aspect is one of the most hopeful signs. The telegraph has long been regarded by many modern engineers as a sort of dead art, one that had exhausted all its possibilities, and had fallen into deep ruts of conservatism and lifelessness. But those who ever entertained such notions will be compelled to revise them and give the telegraph a more prominent place in modern industrial progress.

From an engineering standpoint the telegraph has not received the attention that its importance to the business world warrants, and its possibilities have not hitherto been investigated scientifically as have been the later applications of electricity. The attention of investigators has however been directed to the subject and there is every reason to believe that the telegraph will be established on a more scientific basis enabling the companies to obtain the best possible results from the least expenditure of material and energy.

The paper of Mr. F. F. Fowle read at the recent Boston convention of the Association of Railway Telegraph Superintendents, and printed elsewhere in this issue, is an important contribution on the subject of line conductor requirements for telegraph transmission and should be carefully studied by all interested in the physical development of the telegraph. Mr. Fowle is a trained engineer and has investigated his subject with great care. He has made a special study of the telegraph and points out the necessity for the application of scientific methods to its operation, as in all other modern industrial concerns. The fact that he is as practical as he is technical entitles his utterances to careful consideration.

Is There Stagnation in Promotion?

A correspondent writes: "The largest telegraphic system in the world has made a number of appointments lately. Upon what principal does this company select its men for promotion? When it selects men outside of its own employ, are we to infer that it has no men of its own good enough to promote? Are selections of this kind encouraging to the men, and again what is more discouraging than to have positions occupied year after year by the same person, keeping back all others behind them. The big railways, banks and other corporations have systems for regular promotion. This question is I think equally as important as that of superannuation."

Our correspondent brings up some important questions that are rather difficult to answer in a general way. The solution of the promotion problem has always been one of great concern to employing companies and it is a live question with them as to how to reward faithful and capable employes. The employes of a large industry—we use the term employes in its broadest sense—are naturally divided into two distinct classes, those who plan and supervise and those who perform the work. The official positions are few in number in comparison with those of the lower grades, and, in the case of a telegraph company, there are employes working at the desk who are capable of filling more important positions in the service. Many of these, especially those who live at a distance from headquarters, sometimes grow discouraged at the apparent slowness of reward for faithful services, and are inclined to think that the so-called demand for ability is largely a myth, and that what few vacancies in the higher grades are to be filled go to favored ones.

It may be accepted as a truth that the man who receives an appointment to a higher position receives it because he has rendered services which lead his superiors to believe that he is capable of filling the new duties. It is to some extent true that the

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capable man at a distance is at a disadvantage, and that the capable man at headquarters is more likely to be the one selected other things being equal. This is not always the case, however. Many employes at points distant from headquarters get to the front in spite of so-called obstacles. Individual advancement unquestionably depends largely upon the man, whether he be at the home office or at a country office. If he has the real ability it will become known at headquarters.

Without any reflection, it may be pointed out that some men who think they are capable of filling higher positions and that they are being ignored, are really not as capable as they think themselves to be. They need to broaden their knowledge and thus better fit themselves for more important positions. An extraordinary knowledge of one subject is not so valuable to a man as a good knowledge of many subjects.

The telegraph companies know their men and when they have positions of importance and trust to fill they know where to find the men to fill them. It is very rare indeed that they are compelled to go outside of the ranks to find the ability. In making appointments to official positions it is the practice of the companies to select men from their own ranks, and for obvious reasons preserve their local identity as far as possible. It may be a surprise to many to know that at the present time, when the telegraph business is expanding so rapidly, that the companies do not always find it an easy task to find men to fill official positions particularly those of the higher grades. The local and general official conferences which the companies hold at more or less regular intervals are accomplishing much good in unifying the local and general interests, and incidentally the individual comes in for recognition on such occasions as necessities arise. Men are judged by what they do and not by what they say, and if a man performs his present duties well and is faithful to his trust, wherever he may be, the officials of the company will know of it eventually, and this man will be a "marked man" in one sense.

The companies cannot find outsiders to come in and conduct a business for which they are not trained; therefore the rank and file is and always will be the recruiting ground for candidates for higher positions.

The problem of making room for the rising generation is also a difficult one. Those who occupy the desirable positions seem to be of a long-lived race, and the younger generation naturally gets discouraged waiting for promotion. This condition largely gave rise to the pension idea which is now receiving so much attention. It is a good thing for the companies, too, to pension their older employes and thus bring the energy of youth and modern ideas into the business.

The whole question is a difficult one, viewed from any standpoint, and the telegraph companies themselves are just as much interested in its solution as are the individuals concerned and while there are no doubt many individuals who think they deserve a better fate than utter oblivion in some far-off place, it might be well for these to ask themselves if, after all, the trouble is not largely with themselves and not due to imaginary foes.

Telegraphy and Telephony in China.

During the present year depots will be established in China, for experimental purposes and also for the manufacture of telegraph and telephone instruments and materials and plans will be made for the erection of wireless-telegraph stations along the seacoast. Experiments will be made with automatic telephones in the city of Peking. The telephone systems at Tientsin and the Provinces of Kiangsu and Chekiang will be extended and enlarged.

In 1912 the northern and southern telegraph circuits of Shensi and Shansi Provinces will be extended, and officers will be sent abroad to investigate foreign-made electrical materials and compare them with materials manufactured in China. Telephone and electric-lighting systems in Hupeh Province will be extended, and telephone installations in Hunan and Shantung Provinces will be experimented with. In 1913 China will participate in the international electrical conference. Telegraph lines will be constructed in various provinces and experiments will be made with automatic telephones at Canton, Tientsin, and Shanghai; and with telephones in Shensi and Honan Provinces. Further depots for the experimental manufacture of submarine cables and all kinds of materials for electrical appliances will be established in 1914, and telephone systems will be tested in other provinces.

In 1915 many extensions to the telegraph and telephone systems will be made, the former including inner and outer Tibet, and in 1916 there will be great activity in all branches of electrical application.

Telegraph and Telephone Reports to the Interstate Commerce Commission.

According to Washington dispatches telegraph and telephone companies will not have to make reports to the Interstate Commerce Commission until further legislation by Congress is had on the subject. Congress thought it was putting these carriers on the same footing with railroads, but it so worded the law that the commission is uncertain what is meant. The law was specifically changed so that the commission has jurisdiction over telegraph rates in that it has decided it will exercise a power conferred. Until Congress makes the intent of the law clear the commission will not assume to construe the law that it has the power to order telegraph and telephone companies to make reports to it.

Child Labor in Pennsylvania.—The Philadelphia Child Labor Committee has addressed letters to the Western Union and Postal Telegraph-Cable Companies asking them to voluntarily establish an eighteen-year age limit for messenger boys working at night. The bill fixing the age limit for night work failed to pass the last legislature.

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Possibilities of Railway Telephony.*

BY JOHN A. KICK.

The first train order sent by telegraph was refused by the engineer, as he declared it to be unsafe; yet trains have been dispatched for many years by this method. And now that we have the telephone supplanting the telegraph in train dispatching service, an occasional question is raised as to the safety of the telephone for the work. The transmission on up-to-date dispatch-circuits is so good that an ordinary conversational tone carries the entire length of the line and reaches the dispatcher so clearly and with such volume as to be understood without the straining effort which is experienced on the ordinary telegraph or telephone circuit.

By the discovery of the telephone's adaptability to dispatching, many of the most capable and experienced dispatchers were given a new lease of life in their positions. The telephone is not the nerve destroyer that the telegraph has been and many dispatchers who were on the verge of nervous collapse have grown young again.

For handling messages between way-stations, the telephone is very much superior to the telegraph, as the calling means absolutely no delay and the business can be transmitted with greater speed. One telephone message circuit equipped with selective signaling equipment and a first grade transmission system, will carry as much local way station business as two telegraph circuits in the same service. By this method of handling business at the main office, skilled telephone operators can be economically assigned to each message circuit, giving better service to the way stations than was possible where one operator had to take care of several Morse circuits.

On some short and unimportant branches one circuit has been used jointly for dispatching and message work. In some cases these branch lines have been cut through over a main line circuit by the use of a repeating coil or other means at the junction point. Branch lines may be normally connected to the main circuit or normally disconnected and can be switched selectively from the dispatcher's station or switched manually by the attendant at the junction point. The ringing from the dispatcher's station can be either selective or generator, as almost every circuit has some individual requirements. In arranging for operation it is necessary to go carefully into all the main branch line conditions before deciding on the best method to adopt.

For manual blocking both metallic and grounded telephone circuits are being used, either being superior to the telegraph blocking circuits. The circuits are arranged to be operated locally from station to station, but can be cut through by any station which is not a twenty-four hour blocking station.

In yard service the yardmaster keeps in touch with the entire yard by the use of a system of circuits connecting with the round house, machine shops and other departments over which he may call for or give instructions.

*From the *Telephone Engineer*.

Railway wrecking crews are called by the blowing of the machine shop whistles, by callers visiting the homes of the crew, by telephone service through the city exchanges, and last and best by the installation of a telephone system running from an independent switchboard direct to the home of each member of the crew, allowing the operator of this board to start the bells simultaneously and continuing to ring until each has answered, insuring the prompt starting of the wrecking outfit with full crew at all times.

Great transfer sheds, where forces of men transfer freight by trucking from one car to another, are being outfitted with telephone systems. One such system terminates in the general billing office, where a clerk is constantly on the line as a dispatcher, the foreman, freight checkers and others in charge at the platform and sheds are outfitted with breast plate transmitter and head band receiver on a cord and plug. As they go about the platforms they call into the line the clerk giving and receiving car numbers and assignments. For this service the circuit is brought to a jack at intervals of fifty to seventy-five feet, and the jacks so arranged and placed as to be accessible and at the same time protected from injury. The private branch exchange service in connection with railway operation is quite extensive on the larger systems and is a subject of such importance as to be worthy of considerable study and discussion.

Capable telephone engineers, installers and trouble men are securing good positions with the railways, and as the field is one in which many new conditions are met, the opportunities to show exceptional ability are many and the positions should be attractive.

Measuring Current Without Interrupting Circuit.

Mr. R. W. Paul, of South Newgate, England, has devised a method of measuring the current in an electrical conductor without breaking the circuit to insert an ammeter. The apparatus comprises a contact block with potential points and leads for connection to a millivoltmeter. The contact block is strapped by leather bands to the bare conductor. The millivoltmeter is so graduated that its reading multiplied by the cross section of the conductor in square inches gives the value of the current in amperes. In the case of metals other than copper the readings must be multiplied by the proportional conductivity. A simple circular slide rule is also provided. This is graduated in square inches and in sizes of stranded cable, and enables the value of the current to be read off very quickly.

This apparatus is not intended for use as a precision instrument, but readings can be made within a few per cent. In addition to its use for measuring current the apparatus provides a simple means for testing the conductivities of contacts, joints, fuses, etc.

Any book published on electrical subjects can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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The Integrity of the Telegrapher.*

BY JOHN E. LATHROP.

Not long ago, a matter was discussed by me and a mutual friend in which both of us were concerned; it was vitally important, and immediate communication was necessary with a third person who lived in Portland, Ore. I wrote a telegram, submitting it to my mutual friend; he demurred:

"I wouldn't trust that to the wires," he said. "It might be given away by some employe of the telegraph company."

"Have you done much business with the telegraph companies?" I asked.

"O, yes," he answered, "for many years."

"Have you ever known your private business to be betrayed by any employe of either of the companies?"

"Well come to think of it, I don't know as I have."

"I will venture the assertion," I continued, "that, were you to search your memory back to the time you placed your first telegram on the wires, you would recall not one single instance of such betrayal."

And, sure enough, he could not.

This caused me to think earnestly of the subject, and the more I thought the more I was impressed with the wonderful discovery we had made. These be days when the "muckraker" uncovers abuses in almost every realm of social activity, finds betrayal of public and private interests rampant, and every citizen, in his thoughtful moments, concedes that these abuses do exist, and that the average level of business probity needs to be raised. Is it not true that we watch our grocer, our tailor, our seamstress, the one for sand in our sugar, the other for cotton sewed into our clothing in place of the promised woollen, the other for faked work? And do we not need to watch almost everyone else down the several grades of society, until we reach bank presidents, railroad magnates and captains of industry?

Do we not in our inmost hearts realize that the dictum that "business is business" has made more or less sodden the processes of modern interchange of the products of men's efforts and their distribution to the folks who finally consume them?

Yet, throughout all of this apparent, if not real, degeneration of social business standards, in the twenty-five years I have used the telegraph wire, I have never known an instance of one of "the boys" betraying a trust reposed in him by patrons of that craft. It is an inspiring discovery! It is wonderful! We write telegrams containing the sacred secrets of our domestic lives, the delicate interchanges of thoughts between man and wife, all of the niceties of private intercourse, We write into them secrets vital to our business and professional success. We entrust to "the boys" that, which to reveal to others would, perhaps, spell embarrassment, even disaster.

Yet we "file" these telegrams confidently, knowing that we are safe. Have you fellows of the wires ever realized to what high level of honor you have achieved? Have you known that you wear constantly the insignia of a craft that the people know will keep the faith?

The more I have pondered these things the more I have been convinced that there is the greater genuineness in that splendid type of professional honor for the very reason that I never heard a man of the wires mention it. Certainly there is no room to apply that celebrated bit of philosophy wherein a certain one was suspected because she did too much protest her honor.

I never meet a telegraph operator since that day when we—my friend and I—had that conversation, that I do not feel like taking off my hat to him, as one of the fine products of our civilization that has maintained purest honor in his professional character and never has permitted his profession to be degraded. Possess, as he may, personal weaknesses, sin as he may against other laws that should be kept, yet the telegraph operator pursues his daily duties, keeping the faith of a nation, and investing his craft with a degree of confidence that would add weight to the repute of any mighty man of the ages.

Here's to the telegraph operator, an honest worker, who never thought to tell anyone that he was honest, but who nevertheless is honest to the core.

As I send this "copy" to Travis, I am handing to the Postal messenger boy, a lad I never saw before, a draft for $50 to be cashed. The lad will bring it back to me in an open roll of bills. I know he will—another wonderfully comforting assurance, and proving that Postal messenger boys, along with other messenger lads, have maintained that same fine sense of honor that marks the older men of the company. The other day I stood on the streets of New York and waited until a Postal messenger came back with the cash for another draft I was sending to the Postal to be cashed. Let's include the often abused messenger boy in our honor roll, for certainly he belongs there. So, here's to the messenger, too, whom every business man trusts as he would his own son.

* From the Postal Telegraph.

Lightning Statistics.—Four-tenths of one per cent. of the total number of buildings in Schleswig-Holstein, Germany, are annually struck by lightning. The number of buildings struck in the open country is nearly double that struck in the towns. The strokes were much more frequent and the damage was two and one-half times as great with buildings with thatched or wooden roofs as with slate or metal roofs. The greatest number of electric discharges was observed between 4 and 5 o'clock in the afternoon. All kinds of trees were struck, but certain kinds more frequently than others, depending upon the character of the bark and wood, which in some cases furnish a poorer conductor and thus afford greater protection than others. Poplars were most frequently struck. It was observed that strokes were two and one-half times more frequent in marshy than in dry sections, and that the frequency of strokes decreased with forest growth and increased with its removal.

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Long Distance Wireless Telegraphy.*

In a recent lecture on radiotelegraphy before the Royal Institution, London, Mr. William Marconi gave an insight into the present state of the art of long-distance wireless telegraphy. Air condensers have been adopted at Clifden and Glace Bay and have effected economies in working and in energy losses. It was found to be neither economical nor efficient to attempt to obtain continuous waves. Much better results are obtained when groups of waves are emitted at regular intervals in such manner that their cumulative effect produces a clear musical note in the receiver, which is tuned not only to the periodicity of the electric waves transmitted, but also to their group frequency. Persistency of oscillations is obtained by employing an apparatus consisting of a metal disk having metal studs firmly fixed at regular intervals in its periphery and placed transversely to its plane. This disk is caused to rotate rapidly between two other disks by means of a motor or turbine and the side disks revolve in a plane at right angles to that of the middle disk. The studs are of such length as just to touch the side disks in passing. The frequency employed at Clifden is 45,000, and when a potential of 15,000 volts is used on the condenser, the spark-gap is practically short-circuited during the time in which one complete oscillation only is taking place, when the peripheral speed of the disk is about 600 ft. per second. The primary circuit, therefore, continues oscillating without material loss by resistance in the spark-gap.

An interesting feature of the Clifden plant is the regular employment of high-tension direct current for charging the condenser. Direct current at a potential capable of being raised to 20,000 volts is obtained by means of special direct-current generators. These machines charge a storage battery of 6,000 cells, all connected in series. Each cell has a rating of 40 ampere-hours. When the cells are used alone the working voltage varies from 11,000 volts to 12,000 volts, and when the generators and battery are employed together the potential might be raised to 15,000 volts by using the gassing voltage of the battery. The potential at which the condenser is charged reaches 18,000 volts, due to the presence of choke coils between the battery or generator and the condenser. Satisfactory insulation is obtained by dividing the battery into small sets of cells placed on separate stands suspended on insulators attached to girders fixed to the ceiling of the battery-room.

A curious result noticed in long-distance work is the effect produced by daylight on the propagation of electric waves over great distances. According to Professor Fleming, the effect should be more marked on long than on short waves, but Mr. Marconi has found the reverse to be true. In some transatlantic experiments in which waves about 8,000 meters long were used the energy received by day at the distant receiving station was usually greater than that obtained at night. Recent observations tend to show that the effects vary greatly with the direction in which transmission is taking place, the results obtained when transmitting in a northerly or southerly direction differing from those obtained when transmitting east or west. With wave-lengths of 7,000 meters and 5,000 meters the strength of the received wave remains steady, as a rule, during the day. Shortly after sunset at Clifden they become gradually weaker and about two hours later are weakest. They then begin to strengthen again and reach a very high maximum about the time of sunset at Glace Bay. They then gradually return to normal, but through the night remain very variable. Shortly before sunrise at Clifden they begin to strengthen and reach another high maximum shortly after sunrise at Clifden. The received energy then steadily decreases until it reaches a marked maximum a short time before sunrise at Glace Bay. After that the signals gradually come back to normal day strength.

Mr. Marconi is of the opinion that there is no foundation for the statement to the effect that the earth connection is detrimental to good tuning. A bad earth connection damps out the oscillations due to its resistance, and in that way makes tuning difficult, but no such effect is noticed when an efficient earth connection is employed. The earth wire may have a condenser or its equivalent in series with it.

*From the Electrical World.

A Young Operator.

Mr. Owen A. Conner, manager of the Boston office of the Western Union Telegraph Company has the distinction of being at the time he learned telegraphy, one of the youngest, if not the youngest, person who ever learned the art.

The *Journal of the Telegraph* many years ago printed a letter to the editor reciting the facts. The letter was written at Strasburg, Va. and was dated December 24, 1881. It was signed by "P" and in it the writer says:

"I notice in your issue of December 16, an item of news headed 'The Youngest Telegraph Operator.' I taught a young child in my office, in 1880, in his seventh year; and when he was eight years old he was fully qualified to take charge of a telegraph office. He received and sent messages with Edward Stewart, one of the champion senders. then in Washington City; it was on line No. 18, running from Staunton, Va. to Washington, D. C., this little operator, Master Owen Conner, worked. His father, John Conner, at that time was building manager on the S. V. R. R. between Waynesboro, Va., and Hagerstown, Md., but is now superinteding the building of lines west of Cumberland, Md., and Pittsburg, Pa. for the Western Union Telegraph Company."

Mr. Conner's early training made a first-class operator of him, and he has occupied positions of importance and trust. He was assistant manager of the Associated Press in New York for several years before entering the Western Union service.

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The Late Charles Minot.

BY C. E. MCCLUER, NORFOLK, VA.

In view of the interest that you have aroused in connection with the proposed monument to commemorate the sending of the first telegraphic train order by the late Charles Minot, you may not perhaps be averse to the publication of a few reminiscences of him whose achievement it is thus proposed to honor.

With the foresight and enterprise that were among his chief characteristics, Mr. Minot, then the general manager of the New York and Erie Railway, early discerned the advantages that would accrue to the railway management by the adoption of the newly invented Morse telegraph as an adjunct thereto. Realizing with almost prophetic vision that with the natural increase in passenger and freight transportation, the single track of his road would soon become overburdened and handicapped by the difficulties of moving with dispatch and regularity the large number of train units that would be required, he rightly reasoned that the telegraph would largely solve the problem of handling trains successfully. He therefore, when the telegraph was in the first or second year of its existence, induced his company to authorize the construction of a telegraph line along its right of way, for the exclusive use of the railway management.

When I, a lad of fifteen years, in 1852 entered the service of J. W. Norton, a pioneer in the supply and manufacture of electrical material and apparatus, the railway telegraph line was in process of construction. I found Mr. Norton furnishing material and apparatus for the construction of the line and the equipment of the offices, under contract, and Mr. Minot displaying so much interest in the progress of the enterprise that he would trust no one but himself to give orders for the shipment of material.

It is difficult for one familiar with the electrical industry in this, the sixth decade in the history of the telegraph, to realize that in those early days the Norton establishment was the only electrical manufacturing concern in existence in New York City, if not in the entire country, and that his force of workmen and subordinates comprised only a half dozen journeymen, brass finishers and perhaps an equal number of raw apprentices working in a little shop in Center street near the New York "Bastile," the "Tombs," equipped with no labor-saving machinery or contrivances save a few foot-power lathes and hand drill-presses.

I was Mr. Norton's sole assistant in the storeroom at 177 Broadway, and was required to perform the manifold duties of bookkeeper, cashier, salesman and errand and office boy. On account of Mr. Norton's frequent and protracted absences from the store it often developed upon me to wait on Mr. Minot and show him new material and apparatus, and take his orders. I thus struck up with him quite an intimate acquaintance, and was fortunate in securing his friendship and favor.

On the occasion of one of his visits, Mr. Minot learning of my ambition to become a telegraph operator, volunteered the promise to give me a job on his railway line as soon as I was competent to take charge of an office. Redoubling my efforts to master the art of telegraphy, I practiced assiduously and became so enthused with the idea that I was quite proficient in the use of the Morse alphabet almost before I was aware of it. In fact, having no one to coach me or instruct me in the formation of the dash and dot characters, I did not realize the progress I was making until chance or accident brought an operator into the store one day while I was exhibiting and explaining the operation of the telegraph to a party of visitors anxious to learn something about the time and distance annihilating device. Listening to my dissertation for a while, he finally interposed a suggestion that the party should divide and transmit messages to and fro between the exhibition instruments at each end of the long storeroom. This was done and much interest evinced and amusement enjoyed by the visitors. I officiated at one end of the wire and my friend at the other. After the visitors left us my friend gave expression to the opinion that I was already a good operator and abundantly able to take a position on a commercial wire, adding that I was fully as expert in reading the characters on the register tape, and transmitting the dots and dashes on the wire, as the majority of the fellows in the business.

I had been practicing industriously for five or six weeks, utilizing all my spare time at the key or reading the dead messages on the old register paper sent to us as packing material with instruments returned for repairs, and using my thumb and index finger in the formation of the telegraphic characters while trudging the streets, and the names on the signs over the stores as the subject matter, but I really did not know until on that occasion that I was anything of an operator. My friend however insisted that I hold Mr. Minot up to his promise, which I did on the occasion of his very next visit, with the result that I was soon installed in the railway office at Piermont as assistant to Mr. Chapin, the recently appointed superintendent of the Eastern division.

Thus began my telegraphic career. And now after many vicissitudes and adventures during over fifty years telegraphic and telephonic experience, I find myself back at the "key" where I began. But not the raw youth that I was when Mr. Minot became my benefactor and started me on my electrical career, but in a ripe and rugged old age, though still capable of putting in a good day's work at the key.

I cannot recall whether Mr. Minot's pioneer telegraphic train order episode occurred before or after my connection with the road. But it was a year or two after my début as a telegrapher, and after I had drifted as far West as Owego, before I had an experience which was the immediate occasion of the formal introduction of the telegraphic train order system.

I sincerely hope that a fitting monument to Mr. Minot's genius will be speedily erected and inaugurated.

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Line Conductor Requirements for Telegraph Transmission.*

BY FRANK F. FOWLE, CONSULTING ELECTRICAL ENGINEER, CHICAGO.

Telegraph transmission from an engineering standpoint seems to have attracted comparatively few investigators, and when the author undertook a complete investigation of the subject more than a year ago it was found that the existing literature was extremely meager. On the side of practice the telegraph companies have adhered quite closely to rather ancient standards, although there have been persistent efforts to bring about improvements in equipment and radical changes in transmission methods. Very lately there have been a number of notable improvements in equipment, but practically all of the telegraph business of the country is still handled by the Morse system, with manual operation.

Dealing from an engineering standpoint with transmission problems as they now arise, the Morse system becomes practically the sole consideration. The problem of greatest fundamental importance is how to secure commercially efficient transmission at the lowest cost; and where long distances are involved, the largest single factor is the selection of the line conductor. But overall or total efficiency has here two components, or factors —the efficiency of the line and the efficiency of the equipment. Naturally each affects the other, and a proper solution in any case implies that the chosen combination of line and equipment is the most economical one.

It is very well understood in the case of telephone transmission that the size of the line conductor must be increased as the length of the line increases, which was illustrated in a paper read before this Association, by the author, in 1905. The same is true in the case of telegraph transmission, although no rule could be found which expressed the size or properties of the conductor in terms of the length of the line. Perhaps an exception ought to be made in the case of lines wholly in cable, for there the well known KR law has been employed empirically to find the required properties of the conductor. But certainly in the case of lines made up in great part, or wholly, of open wire, there has been no well established rule or proceedure, except to copy existing practice.

Long experience with Morse transmission, by the various telegraph companies, has gradually evolved the present standard practices, reached in most cases by cut-and-try methods. Today there are two types of line conductors used very extensively, No. 9 B. & S. gauge, hard-drawn copper, weighing 209 pounds per mile and No. 8 Birmingham gauge, B. B. galvanized iron, weiging about 385 pounds per mile. These conductors are standard, the former for the lines of greatest length and severest service, the latter for the lines of short and medium length and quite generally for way or local wires. It has become rather the custom to accept these standards without much question as to how closely they fit the needs of the case, or whether different conductors could not be substituted with a marked saving in cost.

The specific problem placed before the author in the investigation before mentioned was a comparison of various kinds of wire for telegraph service, and a determination of their relative costs. Finding no established theory or proceedure as a guide, it was necessary to develop the theoretical side of the subject rather elaborately. This work led to results somewhat beyond the intended scope of the investigation and pointed the way to numerous improvements in telegraph practice, which will be described in their turn.

Morse transmission as employed so extensively in this country makes use of the familiar closed circuit system, and operates with direct-current sources of e.m.f., or energy. In the transmission of impulses, by the opening and closing of a key, there are two distinctive intervals or time-periods to consider. The first interval is that during which the current is changing from one steady value to another, which commences at the instant of opening or closing, and is termed the transient state. The second commences when the steady current value has been established or the transient state ceases, and continues until the next movement of the key. During the transient state the current obeys very complicated laws and in general it takes the form of a high-frequency oscillation. But the transient state is of very brief duration, except in long cables. During the second or steady state the current obeys Ohm's law in every case.

In general there are two factors of practical moment in judging the commercial quality of transmission. These factors are not always separable, but for present purposes we may regard them as so. The first is the speed of transmission, as affected by the duration of the transient state; if the transient state occupies a comparatively long interval, as in high-capacity cables of great length, the signals must be sent at very low speed in order to preserve their individuality and insure their arrival at the far terminus. On lines of open wire not exceeding 500 or 600 miles in length, the transient state is exceedingly brief, and the speed of signalling is ordinarily far above the maximum ability of an expert manual operator.

The second factor is the strength of the signals. Whenever the line is very highly insulated the final strength of the received signal will equal the strength of the outgoing signal, and both are determined by Ohm's law. Referring again to the case of long cables, it is obvious that an outgoing signal may be cut so short that it will never arrive with full strength at the distant end. But open wires have entirely different properties and the very brief nature of the transient state insures that the shortest signal, with manual operation, will penetrate to the far terminal with full strength, when the insulation is high. In every case, however,

*Paper read before the Convention of the Association of Railway Telegraph Superintendents, Boston, Mass., June 26-30.

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it is evident that inadequate strength is a factor which positively limits transmission, no matter whether the speed is high or low.

Cable transmission, referring to underground and aerial construction, is limited, as we all know, by considerations of speed. There the insulation is ordinarily several hundred megohms per mile, and there is no perceptible loss of current by leakage at any time. Open-wire lines, on the other hand, are never very highly insulated under any conditions, and the degree of insulation fluctuates between wide extremes with changes of weather. Hence both speed and strength of signals must be considered in the latter case, and the KR law is entirely inapplicable for these and other reasons.

Experience with open-wire lines shows us, in a very conclusive way, that where the current strengths are adequate and the relays are properly adjusted, the limits of distance or line length are fixed by the maximum leakage (or minimum insulation resistance) and not by the inability to signal with requisite commercial speed. It is well known, for illustration, that signals can be transmitted to greater distances when the insulation is high, or in fair weather, than when it is low, or during a prolonged or heavy rainfall. American experience confirms this almost universally.

Proceeding from these facts, the theoretical investigation of transmission was confined to a study of the second or steady state, before mentioned, which obeys Ohm's law. The statement of this law in its elementary form is exceedingly simple, but the application of it to the case of a long line with uniformly distributed resistance and leakage requires the use of considerable mathematics, although not of a difficult order.

Mr. Fowle gives the results of the mathematical analysis at considerable length, and then takes up the subject of relative costs of different kinds of line wire.

Under the leakage theory of transmission here developed, the paper continues, the proper basis for comparing different kinds of wire is one of equal conductivity or resistance. This basis, however, only applies to the purely electrical requirements. Equally important is the requirement of tensile strength, including the allied mechanical properties of modulus of elasticity, elastic limit and temperature coefficient of expansion.

Copper and iron have been standard materials for many years, although the so-called iron now obtained is usually mild steel. In the last five years there has appeared on the market a new type of wire known as copper-clad steel, with whose properties some of you are familiar. Fundamentally this wire consists of a steel core with a copper shell or jacket welded thereto, thus avoiding the faults of the early bi-metallic wire. Comparing it size for size with copper and iron, it has more resistance than copper, but less than iron; that is, it is intermediate between the two. But mechanically it is superior to either. Now first of all we need to know how these materials compare in cost for equal resistance.

The proper cost to consider in this case is annual cost, or the sum of the annual interest charges, taxes, depreciation and maintenance. The first cost and the annual cost have been computed for several sizes of each kind of wire, including in the first cost only the wire, insulators, tie-wires, pins, joints and labor of installation—but no pole line cost. Interest and taxes have been taken collectively as 7 per cent. annually, and maintenance as uniformly $1.00 per wire-mile. The total depreciation has been found by deducting the salvage or scrap value from the first cost and adding the cost of taking down the wire when it is worn out; the whole sum has then been divided by the number of years of life, to find the annual depreciation.

The base price used for copper wire is 13.5 cents, with a salvage value of 11.25 cents at the smelter; a small freight allowance has been included both ways.

The base price of copper-clad, current on the same recent date, was 13.25 cents less 3 per cent. for cash in 15 days and 7 per cent. for quantities exceeding 15,000 lbs. The salvage price was 3.5 cents based on actual inquiry of second-hand metal dealers. A freight allowance was made both ways.

The current price of B.B. galvanized iron, which is cheaper for simple conductivity than E.B.B. iron or steel, ranged from 3.25 cents to 4.00 cents, according to size. No scrap value was allowed.

The assumed life for copper is 50 years, based on what the wire ought to do under reasonable conditions. Large wires will last longer, of course, than small ones, owing to the greater strength. As a matter of fact, copper ought to last indefinitely under favorable conditions, because it suffers no corrosion. Its life in service is usually terminated by such factors as heavy sleet storms, the necessity of taking down and moving whole pole lines, gradual stretching and periodical removal of slack, and sometimes by annealing—caused by very heavy foreign currents or exposure to fires. It is also very sensitive to rough handling and often fractures under stress at a small nick or furrow in the surface.

The assumed life for copper-clad is also 50 years, arrived at after a careful study of the properties of the wire and its manufacture, also taking into account the experiences up to this time of numerous users of it. The life of copper-clad ought to be greater, for some reasons, than the life of copper. It is more hardy mechanically and need not be so carefully handled. The tensile strength resides to a great extent in the steel core, which is a large advantage, making it less likely to fracture from nicks or scratches. Compared size for size with copper, it will fail under sleet and wind loads much less frequently and stretch less. It has a much higher elastic limit of strength than copper and consequently relieves itself of stresses due to overloaded spans to a greater degree; this comes about through the increased sag which results from elastic stretching of the conductor. In many cases where copper would stretch permanently, copper-clad will not. Copper is by no means an ideal conductor mechanically,—in fact we tolerate its defects in that direc-

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tion for the sake of the needed conductivity. On the other hand copper-clad is much superior mechanically and its welded copper jacket presents the same resistance to external corrosion as solid copper. The only other place where corrosion can attack the wire is at exposed ends; and experiments made to determine this, under conditions tending greatly to accelerate it, show an absence of corrosive action at the weld and a tendency to corrode at the center of the core, but not penetrating to a serious extent. This is quite the opposite result from corrosive tests on the early bimetallic, non-welded wire.

The assumed life of iron, of the B. B. grade, double galvanized, is 20 years. This figure is rather high, but has been made so purposely, in order to be conservative in comparing iron with copper-clad. A life of 15 years is probably more representative of average conditions.

The comparison of first cost and annual charges, per mile, is given in Table I. Attention is called to the fact that the gauge used in the table is B. & S. for copper and copper-clad and B. W. G. for iron.

TABLE I.

	First Cost			Annual Charges		
Size.	Copper.	Copper-Clad.	Iron.	Copper.	Copper-Clad.	Iron.
No. 6	$65.66	$55.49	$27.61	$6.05	$5.76	$4.36
No. 7	53.83	45.74	23.48	5.17	4.94	3.87
No. 8	44.44	38.04	21.11	4.47	4.29	3.58
No. 9	37.24	32.11	18.64	3.94	3.79	3.29
No. 10	31.33	27.25	17.14	3.50	3.38	3.11
No. 11	26.82	23.51	15.38	3.17	3.07	2.90
No. 12	22.94	20.44	14.38	2.88	2.81	2.78
No. 13	20.21	18.16	13.27	2.68	2.62	2.64
No. 14	17.79	16.16	12.39	2.50	2.45	2.54

The table shows that size for size copper-clad is cheaper than copper from 9 per cent. to 15 per cent. in first cost. But the comparison of cost on a basis of equal transmission efficiency must be made on a basis of equal resistance and in terms of annual

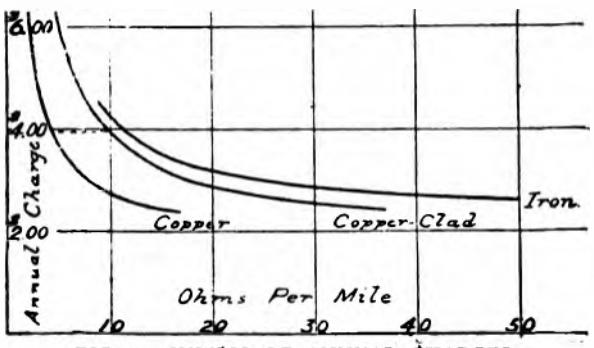

FIG. 1.—CURVES OF ANNUAL CHARGES.

charges. This comparison appears in Fig. 1, where the annual charges are plotted in terms of ohms per mile.

These curves show that in respect to resistance, alone, copper is the cheapest material of all and copper-clad steel second, while iron is the most expensive. It may be emphasized that the showing for iron is the best that can be made assuming it to be new; but when corrosion commences the resistance will increase and then it becomes still more expensive. On a conservative basis, in fact, some increase in resistance should be allowed for at the outset, so that the desired transmission limit will not fall short of requirements before the wire reaches the end of its usefulness or life.

This comparison takes no account, however, of tensile strength. The choice evidently lies between copper and copper-clad, in the first place, on the score of economy. It only remains to take up the question of strength. Obviously copper would be the chosen material for any requirement if it possessed the strength to stand up mechanically. But we know from experience that sizes smaller than No. 9 B. & S. lack strength and even this size fails occasionally in severe sleet storms, and stretches frequently.

The operative limit of such a wire is 437 miles and hence copper is the proper material for lines of this length or greater. But No. 9 B. & S. copper-clad, which is only a trifle less expensive on the score of annual charges, has considerably higher resistance and in consequence an operative limit of only 290 miles. Therefore No. 9 B. & S. copper would be used for all lines between 290 and 437 miles in length. But copper-clad is more economical for all lines less than 290 miles in length,—simplex transmission being always assumed.

This establishes the field for copper-clad in telegraph service, as comprising the lines in general less than 300 miles in length, based on conditions as we find them at present. Where automatic repeater stations can be installed, or now exist, the economical range can be extended very greatly.

* * * * * *

It is convenient to have the operative limits of various sizes of wire of each kind. These are given in Table II, where the sizes of copper and copper-clad refer to the B. & S. gauge and iron to the Birmingham gauge.

TABLE II.

	Operative Distance, in Miles		
Size.	Copper, (B. & S.)	Copper-Clad, (B. & S.)	Iron, (B. W. G.)
No. 6	585	397	306
No. 7	535	358	274
No. 8	485	322	253
No. 9	437	290	229
No. 10	395	261	209
No. 11	357	235	187
No. 12	321	211	172
No. 13	289	188	150
No. 14	260	169	...

While the economical field for copper-clad, under existing conditions of insulation, comprises the lines of 300 miles or less, its field can be extended to 600 miles if the insulation is raised to one megohm per mile. This means, of course, the adoption of better insulators. While this implies an increase in the cost over the present glass insulator, there is every reason to believe that it will be a final economy of no small importance.

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METHODS OF IMPROVING TRANSMISSION.

The best conditions for securing the desired transmission most economically have already been covered in part. These will now be recapitulated and several new features added.

(1). SOURCE OF E. M. F.—Divide the total e. m. f. into two equal parts and place one at each terminal. The lumping of the whole e. m. f. at one terminal is the least efficient arrangement possible. Use power generators, motor generators, or dynamotors instead of batteries wherever feasible and economical. When batteries are necessary, operate but one line per battery except where the lines are short and the margin ample.

(2). TERMINAL RESISTANCE.—Keep the total terminal resistance at a minimum. Use resistance lamps with iron filaments instead of carbon. Also keep the terminal resistances as nearly equal as possible. When a generator or some equivalent source of e. m. f. is employed, never use one lamp tap for more than one line, unless the lines are short and the margin ample.

(3). CIRCUIT BREAKERS.—An automatic circuit breaker, of special design, is recommended as a substitute for the lamp resistance. This will avoid the resistance in large part and provide fully as much safety. The circuit breaker can be arranged, if desired to cut in the protective lamp resistance instead of opening the line entirely.

(4). RELAY WINDINGS.—The most efficient insulating material known for magnet windings with wires of small size, is enamel. It occupies less space than a covering of single silk. Consequently the necessary number of turns can be secured with less total resistance. The neutral relay in a quad set is most in need of improvement, comparatively, and here enamel will be of special advantage. One manufacturer who makes both polar and neutral relays, uses enamel with the former and silk with the latter; the practice ought to be reversed—but better still, enamel should be used entirely.

(5). ARTIFICIAL LINES.—The artificial lines employed in duplex and quad equipments, with their lumped resistance, capacity and leakage are exceedingly crude imitations of a real line with the same properties uniformly distributed. Improvement in such equipment, along the pattern of the artificial line described in this paper, will help in extending the range of transmission. The plan may also be carried so far as to provide the artificial line with the electrical equivalent of the distant terminal, which is likely to be of most benefit when the line insulation is at its maximum. The design of such a line offers no serious difficulties, but it will be somewhat more expensive.

(6). RELAY DESIGN.—This subject has been treated at some length in the author's American Institute paper, but the point to be emphasized is the fact that the use of enlarged pole-pieces, with a magnetic circuit of a certain class, increases the pull on the armature. Putting it differently, the pull now obtained in a 150-ohm relay can be produced in a relay of the new type with only a small fraction of that amount of resistance.

(7). IMPROVED INSULATORS.—The advantages of better insulation have already been demonstrated. The means of securing it will be discussed briefly. There is already some experimental evidence, although not extensive, that glazed porcelain makes an insulator superior to glass. But one of the prominent faults of the standard glass insulator is its form, coupled with the method of mounting it. Dependence for insulation is placed primarily on maintaining a dry interior under the outer petticoat, but this fails of realization on account of spattering of water (during rainfall) into the petticoat from the top surface of the cross-arm beneath the insulator.

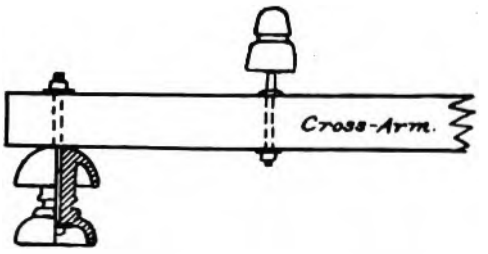

FIG. 2.—INSULATOR BENEATH CROSS ARM.

A superior method of overcoming this appears to be the use of an insulator placed beneath the cross-arm and held by a rigid pin, after the plan shown in Fig. 2. This removes the objection of

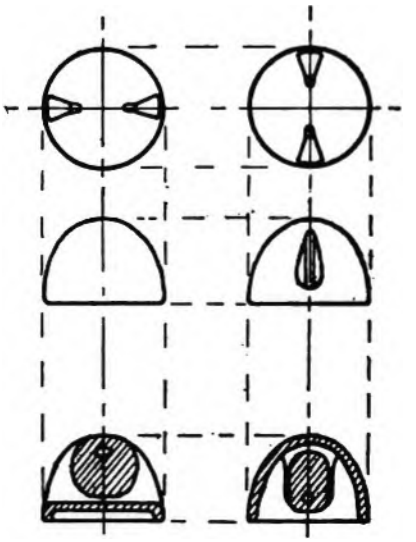

FIG. 3.—NEW TYPE OF STRAIN INSULATOR.

spattering from the arm and is mechanically just as rigid as the present standard; a large under flange is employed to prevent the tie-wire from slipping down.

A more radical proposal is the use of a flexible

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suspension with a strain insulator of the type shown in Fig. 3. This plan is suitable for straight portions of pole line and owing to its flexible character will tend to reduce wire-stripping in a heavy sleet storm. The insulator itself is suspended from the cross-arm by a loop of wire, and the line wire is supported in turn from the insulator by means of a tie-wire. Attention is called to the form of tie, which is wrapped around the line from each side toward the center, in opposite directions, with the ends pig-tailed at the center; it is practically impossible for it to fail except by fracture. These plans for improving the insulation, and others, are discussed in the other paper before the American Institute of Electrical Engineers, more fully than space permits here.

Vibratory Sending Machines.

BY JOHN A. ESSLINGER, OF WASHINGTON, D. C.

Before the recent discussion arose as to the detrimental effect of vibratory sending machines upon multiplex circuits and knowing of the practical impossibility of passing machine-made signals through repeaters when the signals were speeded up to a point beyond the carrying capacity of the circuit, I realized that if a single set would not carry the rapid dots and dashes a duplex pole-changer certainly could not do so, let alone a quadruplex. The sending machine can be set for a speed of 40 or 45 words per minute by proper adjustment of the weights, one at the spring point and the other at the end of the vibrating device, and it will transmit as well, if not better, than the average hand sending.

The inability of the standard instruments to respond to high speed impulses is due to the fact that an electrical impulse requires time to reach its maximum value. We provide a means in a telegraph line to meet the impulse as nearly half-way as possible, but then the armature of the relay must travel its course without assistance and it is only by reducing the distance between the contact points that higher speeds are possible.

If a telephone receiver is connected between a sending machine and a relay it will be found that the discharge vibrations of the diaphragm receiver and the front contact of the relay armature will occur simultaneously when the speed exceeds the operating capacity of the relay.

On a single line measuring 2,000 ohms resistance with several 150-ohm relays in circuit, each exercising a retarding influence, it is evident that the charges and discharges of the line will reduce the working margin to such a degree that the most distant relay gets only a small amount of current variation.

Sometimes an increase in current strength will aid in carrying the rapid impulses over the line, but when this is done we develop other troubles. Frequently an operator at one end of a single line complains that there is no margin or that the signals come weak, while at the other end the reverse condition exists.

A test was recently made on a New York—Washington circuit which developed a condition similar to this. There was an electrical pressure at New York of 80 volts with an average of .100 amperes, while at Washington there was a pressure of 110 volts and an average of .021 amperes. Such discrepancies could be easily remedied if the line and equipment permitted one office to decrease and the other increase its current output to meet such conditions as these at a moment's notice.

The following table shows why such conditions are difficult to overcome. The table was prepared from average readings taken over a period of two weeks in good weather on two wires, one leased from the Western Union and the other from the Postal. The values given are in milliamperes.

VARIATION IN CURRENT AT WASHINGTON ON OPENING AND CLOSING.

	Line A		Line B	
	Min.	Max.	Min.	Max.
Circuit closed	54	62	23	37
Washington sending	0	58	0	33
Baltimore sending	9	56	4	31
Philadelphia sending	17	54	11	28
Newark sending	21	52	16	26
New York sending	25	51	18	25

Taking a variation of only seven milliamperes in ordinary hand speed, it is not to be wondered at that speeds two to three times as fast made with a vibrator would reduce the margin of current to barely enough to start the relay armature. The variation of twenty-five milliamperes required an adjustment to compensate for the current strength and the impulse must be proportionate. It can be stated that the cause for such a condition is due to a partial ground at some point on the line, usually by moisture effecting an escape. In damp weather when the escape is general or unevenly distributed, the speed of the vibrator is an important factor. If it is too high the dots will not go through, but if the vibrator is held down with sufficient weight, it will form dots superior to hand-made dots, first because there is more uniformity in the contact up to the seventh or eighth dot than any but the most accurate hand can execute; second, because the cleavage is more clearly defined by allowing a greater opening than is usually given the points of a key owing to the inability of the hand to work well on too wide a swing, and third, because the machine produces an initial physical reaction which a key does not, thereby relieving the nerve-trying delayed "sender's interval" when the line is responsive.

Mr. E. W. Collins, district superintendent, Postal Telegraph-Cable Company, Cleveland, Ohio, writes: "I have been renewing my subscription to the TELEGRAPH AND TELEPHONE AGE for so many years that it has become a habit—one of my good habits—and the publication has grown better from year to year, just as you and I have grown older."

Subscribe for Telegraph and Telephone Age. It is the leading paper of its class in America.

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QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. Having completely covered Mr. Jones' book we are now covering "The Quadruplex," by Maver and Davis, and will bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER VI.

Referring to Fig. 25, which is of the polar duplex, what are condensers *C* and *C'* adjusted for?

Under what circumstances does the line static discharge manifest itself?

What is the effect upon the line discharge of the condenser discharge?

What should be the value of the resistances *H* and *H'*?

How are the electro-magnets of the polar relays wound?

Under what conditions will no magnetism be produced in the home relay?

What will be the effect of placing battery *B'* in the circuit with its negative pole to the line?

What is the result of placing the positive current to the line?

Study carefully the effect of opening the key of the home pole changer while the negative pole of battery *B'* is to the line.

Under this condition is there any current on the line?

What becomes of the current from the two batteries when they are placed in opposition to each other?

If a battery with a strength of 50 units at one end of the line is placed with its positive pole to the line and a similar battery at the other end with its positive pole to the line also, how much current will there be on the line and what will be its sign?

Reverse the polarity of one of the batteries so that its negative pole will be presented to the line, what will be the value of the current on the line and what will be its sign?

If a battery of 100 units positive is connected to line at one end and another battery of 50 units negative at the other end, what is the resultant current upon the line?

Is the magnetic polarity of the home differential polar relay affected by changes of polarity of the home battery?

Deterioration of Ebonite.

Ebonite, or, as it is commonly called, hard rubber, is affected by light and the sulphuric acid thus freed decomposes the material. This effect is shown by discoloration.

The deterioration of ebonite has been investigated by the English national Physical Laboratory and the results are published in the annual report of that institution. Samples of many qualities of ebonite were placed under a sheet of glass to protect them from dust, and exposed for many months to a north light. A portion of each was covered with a brass disk which protected some of the surface of the material from the action of the light, and the production of acid could be roughly gauged by the gradual discoloration of the brass. It was found that a yellow glass acted as a great protection and that a blue glass had but little effect in delaying the production of free acid. The effect can be greatly reduced by covering the apparatus with a glass whose surface is coated with a layer of gelatine containing a yellow or red dye, but this has not been found a complete protection. The only entirely satisfactory method, where high insulation is required, is to cover all ebonite by wood or opaque glass or other material, leaving holes for the handles required for manipulating the necessary switches and for making the electrical connections. A third arrangement which has been successfully adopted is to depend on amberite (an artificial amber made from amber waste) for insulation.

The insulation may be restored by thorough washing, and it has generally been found that the rate of production of acid diminishes and that the trouble lessens as time goes on. In certain qualities of ebonite this is accompanied by a change in the color of the surface, which gradually becomes a greenish gray, and which, as far as observation has gone, is electrically as good and more permanent than the polished black new surface. It is quite possible that a satisfactory material might be produced by aging the surfaces through exposure to a strong light and by frequent washings.

Seasoning Wood by Electricity.

The following item from a British technical paper concerns a new process of seasoning wood by electricity in France.

A large tank is filled with a solution containing 10 per cent. of borax and 5 per cent. of resin, with a trace of carbonate of soda. In the bottom of the tank is a lead plate which is electrically connected to the positive pole of the dynamo. The timber to be treated is stacked on this plate, and when the tank has been filled another plate is superimposed and connected to the negative pole of a dynamo. When the current is switched on it passes through the stack of wood between the two plates, and in its passage it is said to drive out the sap in the timber and deposit borax and resin in its place, completely filling up all pores and interstices. When the process is completed the timber is removed and dried, after which it is ready for use. It is claimed that the timber submitted to this treatment, no matter how green it may be, becomes completely seasoned.

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High Speed Automatic Perforators, or Perforator Receivers.*

BY WILLIAM MAVER, JR.

The recent introduction of a night and day "letter" service in this country has virtually necessitated a further resort to the use of automatic telegraphy for the more efficient and possibly more economical handling of the increased business which this service has developed, and should the public appreciation of this service continue to grow no doubt there will be need for a still greater extension of automatic telegraphy in this country.

Thus far the Wheatstone automatic system is the one at present most favored and perhaps this system will continue to be the one most generally employed in connection with certain adjuncts in the shape of key-board perforators for the rapid preparation of messages for transmission, and various forms of so-called receiver perforators which automatically perforate a paper strip with holes representing the dots and dashes of signals arriving at repeating stations (or, if desired, at terminal stations), thus saving the labor and expense of manual reception (or transcription) and subsequent manual re-transmission at such repeating stations.

The nature of the business to which the night and day letter service caters, may be classed as consisting of telegrams, the immediate delivery of which is not vitally important, and therefore may be deferred.. This class of business is largely commercial and social and consequently it concerns the regular telegraph companies more than the railway telegraph departments, but it may be that a brief description of automatic perforating and transmitting devices now being introduced in this country and of others already in use in various other parts of the world for the handling of business of the general nature of night and day letter service, press news, etc., may suggest a possible use of such apparatus in the railway telegraph service. But be that as it may it is believed by the writer that the apparatus in question is itself of sufficient merit and importance to attract more than passing interest on the part of those engaged in the practice of telegraphy in any of its departments, more especially indeed when it is stated that the utility of automatic perforators is not by any means limited to the transmission of press news or to deferred telegrams, as is manifested by the fact that they are also employed in regular telegraph service abroad and are finding an increasing and valuable use in connection with the operation of long Wheatstone duplex circuits of some international telegraph and cable companies.

It is, of course, generally known that messages are prepared for transmission by the Wheatstone automatic system by perforating holes in a paper tape, which holes represent dots and dashes of the Morse or other codes. This tape is in turn passed through a transmitter which, by a system of rapidly oscillating vertical rods, operates a pole changer which results in the transmission of dots and dashes (corresponding to those representing the letters and words of the prepared message) over a line at a speed of about 600 words per minute, on short lines, and at about 100 words per minute in each direction on long duplex circuits, such, for instance, as the New York-Chicago duplex circuits. The messages thus transmitted are usually received on a paper strip in dots and dashes by an ink recorder operated by a main line polar relay.

In the preparation of these messages for transmission, two general methods are employed, namely, the mallet puncher and a keyboard perforator. By the mallet method, three punching keys, or discs, are struck separately by the operator with a rubber tipped mallet; No. 1 key for a dot, No. 2 key for a space, and No. 3 for a dash. The dot key punches two large holes opposite in the paper tape and one center hole; the dash key punches two large holes diagonally across the tape and two center holes; the space key simply perforates a small center hole and advances the paper. This method of preparing the messages, although obviously cumbersome, fatiguing and compaartively slow (about 20 words per minute) is still in extensive use in connection with this system of automatic telegraphy. But as previously intimated, keyboard perforators are also now employed, by means of which the characters of any letter of the Morse alphabet are perforated on the tape by the depression of the key representing that letter. The Buckingham keyboard perforator in this country, and the Gell keyboard perforator in Europe and other foreign countries are the ones most generally employed. The Gell perforator has many points of simplicity, and is in use in numerous instances in the British Government telegraph and newspaper telegraph departments in Great Britain, for the preparation of press dispatches for transmission by the Wheatstone system. By keyboard perforators messages are frequently punched at the rate of 60 words per minute; and in Europe it is common practice to feed the tape thus perforated directly from the keyboard perforator to the Wheatstone transmitter, the keyboard operator supervising the entire operation.

As already noted it has long been the custom to receive the dots and dashes transmitted by the Wheatstone automatic system in Morse characters in ink on a paper strip, from which strip the message is transmitted, or typewritten, by a copyist. In repeater stations, however, the message is frequently relayed by an operator who reads the message directly from the tape, thereby avoiding manual transcription of the message in the repeating station. But to avoid even the necessity for this manual repetition of a message is one object in using automatic receiver perforators,

* Paper read at the Boston Convention of the Association of Railway Telegraph Superintendents, June 26-30. Abridged.

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or re-perforators. It is a comparatively simple matter to punch short and long holes in one line in a paper strip, as the dots and dashes are slowly received on a Morse relay, but the matter of re-transmitting the message at high speeds from these perforations presents some difficulties. Besides it involves the installation of apparatus different from the existing Wheatstone, thereby adding to the diversity of apparatus in an office, which is sometimes considered more or less objectionable. The Stevens-Wheatstone perforator is a high speed automatic re-perforator of this type. The perforated paper tape is used for re-transmission.

The d'Humy high speed receiver perforator is in use in the Postal Telegraph-Cable Company's service. Unlike the perforations made by the Wheatstone perforator and the Gell re-perforator, which for a dot, dash or space are always of the same length on the paper strip, the holes in the d'Humy perforated strip vary as to distance between them according to the speed of transmission and the rate at which the paper tape is drawn along. Also the perforations for a dot or dash depend on the interval between the marking current and the next spacing current. This receiver perforator is capable of perforating the paper strip at a maximum rate of about 90 words per minute. The maximum speed of re-transmission from this tape is about 50 words per minute.

The Creed high speed automatic re-perforator is due to Mr. F. G. Creed of London, and has come into use within the past few years. By its means the signals received by a main line Wheatstone relay are automatically reproduced in facsimile of the original Wheatstone perforated strip, at a speed of approximately 200 words per minute, which strip can be re-transmitted by a Wheatstone transmitter at any desired rate of speed, within the capacity of the circuit.

Under the control of line signals from a Wheatstone transmitter this automatic perforator is capable of punching the paper tape at a maximum speed of 200 words per minute. Its normal speed is from 125 to 150 words per minute. An important advantage of this tape is that being an exact reproduction of the Wheatstone perforated slip it may be utilized for re-transmission through a Wheatstone transmitter at any speed of which the original is capable. It is worthy of note also that this perforator will reproduce on the paper strip a fac-simile of the Buckingham-Barclay printer alphabet at a higher rate of speed than the same characters can be converted into Roman letters by the printer. Hence, if desired, this strip could be utilized to transmit local traffic into the printer on a local circuit and the through traffic could be re-transmitted from the perforated strip, without additional manual preparation or manual transmission, by the Wheatstone transmitter or other printer circuits.

It is well known that the position method of signaling is employed in submarine cable telegraphy, that is, dots are recorded on one side of a zero line and dashes on the other side of a paper strip by the siphon recorder, and dots and dashes, arbitrarily so called, are of equal length. Then signals are now very generally transmitted over the cable circuits by a machine akin to the ordinary Wheatstone transmitter, but the arrangement of the perforations on the paper strip are different from those of the regular Wheatstone strip, the dot perforations being on one side of the strip, the dashes on the other. The same inventor, Mr. Creed, has devised a machine termed a perforator translator, by which the ordinary Wheatstone strip received by a perforator receiver from the land lines is a cable telegraph station, is translated into a perforated strip for transmission by the cable automatic transmitter. The translator consists of a system of rods which pass through the holes of the Wheatstone strip, or are restrained from this movement by the uncut paper, the mechanism so acting as to produce holes corresponding to dots on one side of the paper and to dashes on the other side. The power for operating the punches in this machine is supplied by a crank pin on a disc operated by an electric motor, in a measure somewhat analogous to that of the Stevens-Wheatstone perforator.

It will be obvious on consideration, as Mr. Creed has mentioned to the writer, that successful practical devices of this kind may find numerous applications. For example, on very long circuits, such as those between New York and San Francisco, which, with ordinary automatic or direct point repeaters might not, under the most favorable conditions, operate at much over manual transmission speed. By placing automatic perforators at the repeating stations a speed equal to that obtainable on the longest single section of the circuit may be attained, which speed might readily be more than double that of hand transmission. The time thus saved on the shorter sections when still higher speeds are of course attainable could be utilized for the transmission of local business. Obviously also in the event of wire trouble on one section of such circuits the business could be automatically perforated at the terminals of that section and transmitted when the wire trouble is removed or, in the meantime, could be re-transmitted by alternative routes, without additional manual preparation.

Another advantage in this relation is that, and referring especially to the Creed device, new and perfect perforated slips are supplied at each repeating station since a distortion of signals that would act unfavorably on a direct point repeater is automatically corrected by this receiver perforator, which by means of its correcting rods has, according to the inventor, a margin for correction of distorted signals of about 50 per cent.

In fact, the Creed receiver perforator has already been utilized in the manner indicated on the 4,000 mile circuit of the Indo-European Company from London to Karachi, India. This cir-

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cuit has been operated by Wheatstone automatic for several years and has required ten repeating stations, namely at Lowerstoft, Emden, Berlin, Warsaw, Rouno, Odessa, (Russia), Kertch, Sukhum, Kaleh, Tiflis and Tauris. More recently a Creed re-perforator has been installed at Odessa, this breaking up the circuit into two parts with a resulting increase in speed and reliability. Also the Eastern Telegraph Cable Company, operating between Great Britain, Egypt, India, Capetown and Sydney (Australia), is now introducing twenty-six of these perforators on its lines, and these perforators are now in use in Great Britain and other parts of Europe. Hence, from the foregoing, it is evident that automatic perforator receivers have passed the experimental stage, and there appears to be little question that the near future will see an increased employment of such devices, either in their present or in an improved or modified form.

DISCUSSION.

Mr. A. G. Saylor, general superintendent of the Western Union Telegraph Company, New York, being invited to make some remarks, said:

"Permit me to say that I have listened with great interest to the paper just read by Mr. Maver, who so ably and fairly presents the various features of automatic telegraphy. It occurred to me that possibly some remarks in connection therewith may be of interest. I wish to confine myself to the operation of the automatic service, as at present employed in the Eastern Division of the Western Union Company. I will not attempt to bear upon the technical features of the automatic transmission of messages, and it is understood that nothing stated shall be construed as comparing one automatic with another, in either efficiency or economy in operation. All automatics in actual practice have their advantages and disadvantages. At the present time we have in our service, three classifications of automatics, first, the Wheatstone, second, automatic cable transmitter and recorder, third, the automatic printing system.

"I believe it will be conceded that the Wheatstone, in its field, is unexcelled, and is particularly adapted to long land circuits. It is in operation in the Eastern Division between New York and Chicago, and between the Central Cable Office and North Sydney cable station, Nova Scotia. The tape as received is pasted upon the regular receiving blanks, which are then distributed throughout the operating departments, the same as any other messages. With very limited experience, all Morse operators can readily read the Wheatstone tape as recorded in the Morse alphabet. Therefore, the necessity for transcribing this tape is entirely eliminated. The Morse characters as they appear on the Wheatstone tape may not always be uniform, but any imperfection is as readily interpreted as the imperfections of a Morse sending operator. On the ordinary Wheatstone circuit, the average speed approximates 100 words per minute.

"In connection with handling cable traffic, the technical features of the system have been very clearly and ably stated by Mr. Maver. In reference to the automatic perforation of the receiving tape, preparatory to transmission this may have at the present time passed the experimental stage. I believe that it will be obvious in operating practice to concede its value, particularly at relay points, for the reason that it obviates the necessity for manual perforation and any delay incident thereto, but in this connection it should be explained that at cable relay stations, there are two methods employed in transmitting from the receiving tape. On our cable between New York and Penzance, England, via Bay Roberts, N. F., the speed of the two sections is uniform, and the capacity is somewhat over two hundred letters per minute. At Bay Roberts the receiving operator perforates directly from the slip as it is received, and the tape is fed into the transmitter of the second section of the cable. At our Canso, N. S., cable station, the operator transmits the messages from the tape over the second section of the cable as received, the automatic transmission being employed only at times when the load of the traffic justifies it. At some of the intermediate cable stations, there has been employed for many years, an automatic relay or repeater, which is equivalent to the automatic repeater of the land line circuits.

"There is no perceptible difference in operating expense between the automatic relay or repeater and the present method employed in the combination of manual relaying at intermediate cable stations. Automatic repeaters at intermediate stations, do not to any great extent decrease the operating expense. It is doubtful whether the automatic repeaters reduce to any extent the operating cost, for the reason that at the cable stations where they are employed, the operating force has not to any extent been reduced, as it is necessary to maintain the force to meet emergencies when they may arise. The vested capital in the cables is so great that the operating expense is not a great factor compared with the benefit to be derived by operating them to their full capacities as and when required, and to render the public a prompt and reliable cable service.

"Mr. Maver has made reference to the siphon recorder. This recorder at rest makes a straight or neutral line or demarkation on the tape. Upon the reversal of the current by the transmitter, the dots are recorded on one side of the neutral line and the dashes on the other. As you know, the Continental alphabet is used. On many of our cables, the number of dots of a letter is judged by the duration of the period that the siphon records, before it is attracted to the neutral line. The definitions on the tape of various cable circuits materially differ one from another depending upon the length and capacity of the cable. At many stations cable operators of experience can read the tape on the short section but it is with difficulty that they can readily read the definitions of the siphon recorder on the longer sections. At the terminii of the cables, we employ two experienced cable operators on the receiving side of each. The cables as you know are worked duplex. As the tape comes from under the siphon, a cable operator transmits in Continental alphabet

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to a receiving operator at his side who writes the cablegram on a typewriter.

"The automatic printing system depends entirely upon electrical and mechanical perfection in its operation. The printer now employed has recently been improved so that its efficiency is fairly well maintained during weather-bound conditions. By reason of its sustained efficiency, we now average on the various circuits, approximately 90 messages per hour The messages are first perforated by use of keyboard perforators and fed through an automatic transmitter, and at the receiving station are received automatically in typewritten form, on regular receiving blanks, ready for distribution and delivery. I am not prepared to say that there is any economy in operating expense in the employment of automatic transmission as compared with the regular transmission of business by Morse, but there is no question that there is great economy in plant costs in connection with both the Wheatstone automatic and our printer system."

Mr. W. J. Camp, of Montreal, described the methods in vogue in transmitting business to and over the British Pacific Cable. The Canadian Pacific land lines connecting with this cable between Montreal and Bamfield is operated daily, the distance being over 3,100 miles. The Wheatstone system is used on this circuit entirely whether there is one message or one hundred. Perforated tape is used for transmission on the cable between Bamfield, B. C., and Fanning Island, which he understood is the longest cable in the world. He did not favor vibratory transmitting machines. They do not carry through repeaters so well as hand transmission.

Morse Electric Club Outing.

The summer outing of the Morse Electric Club was held at Donnelly's Boulevard Hotel, College Point, L. I., N. Y., July 8, over one hundred members being present. The weather was delightful and a very enjoyable time was had by all. The party was conveyed to College Point from New York in the afternoon by the Western Union Company's cable steamer, *Robert C. Clowry*, which was placed at the disposal of the club for the purpose. During the afternoon athletic contests were held on the grounds adjoining the hotel.

The baseball game between the Operators and the Executive Department clerks was won by the former, the score being 5 to 3.

The 100 yard dash, handicap, for members only, was won by Mr. J. A. Dierks, Mr. W. A. Schudt, being second, and Mr. L. D. Beall, third.

The second race, 100 yard dash, handicap, was won by Mr. W. C. Merly, Mr. J. A. Berry, second, and Mr. J. A. Sweeney, third.

The third race, 100 yard dash, free for all, (non-members) was won by Mr. J. C. Coffey with Mr. L. V. Murphy second and Mr. H. Ayres, third.

The fat man's handicap of 60 yards was the next event and caused considerable merriment. It was won by Mr. J. F. Nathan, with Mr. J. F. McGuire, second, and Mr. M. J. Hayden, third.

The free for all race, 100 yard handicap, was won by Mr. A. C. Gibbs, Mr. W. Finn taking the second prize and Mr. A. Finn the third.

The starter in these events was Mr. J. F. Nathan and the judges were Messrs. B. H. Reynolds, and L. Dresdner.

An excellent dinner was served and during the meal entertainment was furnished by a guitar and mandolin quartette and songs by Mr. W. Logan, all joining in the chorus. At the conclusion of the dinner there was a drawing for prizes which included canes, umbrellas, fountain pens and roasts of beef.

The party returned to the city by boat and the sail on the sound and river in the moonlight was delightful. During the games in the afternoon the party was interested in the flight of an aeroplane high above the ball field.

The Turner Monument Fund.

At the recent meeting in New York of the Railway Signal Association favorable mention was made of the Turner Monument project and it is probable that this branch of the railway service will support the movement.

Mrs. Geo. S. Minot, of Brookline, Mass., a niece of the late Charles Minot, has subscribed $25 toward the Turner Monument Fund. Mrs. Minot was a guest of honor at the recent convention in Boston of the Association of Railway Telegraph Superintendents and prior to the session of the first day she received in the hotel parlors those members of the Fund committee that were present.

Mr. E. P. Griffith, chairman, and the other members of the Fund Committee, are to be congratulated on the able manner in which they have handled the work of securing the necessary funds and the generous response of Mrs. E. H. Harriman, of Arden, N. Y., has given special gratification. The committee in co-operation with Mrs. Harriman's representative and Sculptor Charles Keck of New York, are actively engaged on the final preparations for the monument.

Any one who desires to contribute toward the fund has yet an opportunity to do so. No one having any pride in the object of this project should fail to subscribe. The list is still open, and contributions should be forwarded to the treasurer, Mr. J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Contributions received up to date are as follows: Previously acknowledged, $1,616.25; Mrs. Geo. C. Minot, Brookline, Mass., $25.00. Total, $1,641.25.

Indictment of Wire Corporation Officials.—The grand jury, United States Circuit Court, New York, on June 29 returned nine indictments against officers of the American Steel and Wire Company and thirty-five other corporations and partnerships in the steel and wire industry which the Federal authorities have been investigating. These indictments are found under the Sherman Act, and charge a combination and conspiracy in restraint of interstate and foreign commerce.

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Report of Committee on High Tension Wire Crossings.*

The Committee on High Tension Wire Crossings submitted specifications for overhead crossings of electric light and power lines, the same being the joint report of similar committees of the National Electric Light Association, the American Railway Engineering and Maintenance of Way Association, the American Electric Railway Association, the American Institute of Electrical Engineers and the Association of Railway Telegraph Superintendents.

Following are the specifications recommended for adoption:

GENERAL REQUIREMENTS.

1. SCOPE: These specifications shall apply to overhead electric light and power line crossings (except trolley contact wires) over railroad right-of-way, tracks, or lines of wires; and, further, these specifications shall apply to overhead electric light and power wires of over 5000 volts constant potential, crossing or constructed over telephone, telegraph or other similar lines.

2. LOCATION: The poles, or towers, supporting the crossing span preferably shall be outside the Railroad Company's right-of-way.

3. Unusually long crossing spans shall be avoided wherever practicable.

4. The poles, or towers, shall be located as far as practicable from inflammable material or structures.

5. The poles, or towers, supporting the crossing span, and the adjoining span on each side, preferably shall be in a straight line.

6. The wires, or cables, shall cross over telegraph, telephone, and similar wires wherever practicable.

7. Cradles, or overhead bridges, shall not be used.

8. CLEARANCE: The side clearance shall not be less than twelve feet (12'0") from the nearest rail of main-line track, nor less than six feet (6'0") from the nearest rail of sidings. At loading sidings sufficient space shall be left for a driveway.

9. The clear headroom shall be not less than thirty feet (30'0") above the top of the rail under the most unfavorable conditions of temperature and loading. For constant potential, direct current circuits, not exceeding 750 volts, when paralleled by trolley contact wires, the clear headroom need not exceed twenty-five feet (25'0").

10. The clearance of alternating-current circuits above any existing wires, under the most unfavorable condition of temperature and loading, shall be not less than eight feet (8'0") wherever possible. For constant potential, direct-current circuits, not exceeding 750 volts, the minimum clearance above telegraph, telephone and similar wires, may be two feet (2'0"), with insulated wires and four feet (4'0") with bare wires.

11. The separation of conductors carrying alternating current, supported by pin insulators, for spans not exceeding 150 feet shall be not less than:

Line Voltage.	Separation.
Not exceeding 6,600 volts	14½ in.
Exceeding 6,600 but not exceeding 14,000	24 in.
Exceeding 14,000 but not exceeding 27,000	30 in.
Exceeding 27,000 but not exceeding 35,000	36 in.
Exceeding 35,000 but not exceeding 47,000	45 in.
Exceeding 47,000 but not exceeding 70,000	60 in.

For spans exceeding 150 feet, the pin spacing should be increased, depending upon the length of the span and the sag of the conductors.

NOTE.—This requirement does not apply to wires of the same phase or polarity between which there is no difference of potential.

With constant potential, direct-current circuits, not exceeding 750 volts, the minimum spacing shall be ten inches (0'10").

12. When supported by insulators of the disc or suspension type, the crossing span and the next adjoining spans shall be dead ended at the poles, or towers supporting the crossing spans, so that at these poles, or towers, the insulators shall be used as strain insulators.

13. The clearance in any direction between the conductors nearest the pole, or tower, and the pole, or tower, shall be not less than:

Line Voltage.	Clearances.
Not exceeding 14,000 volts	9 in.
Exceeding 14,000 but not exceeding 27,000	15 in.
Exceeding 27,000 but not exceeding 35,000	18 in.
Exceeding 35,000 but not exceeding 47,000	21 in.
Exceeding 47,000 but not exceeding 70,000	24 in.

14. CONDUCTORS: The normal mechanical tension in the conductors generally shall be the same in the crossing span and in the adjoining span on each side, and the difference in length of the crossing and adjoining spans generally shall be not more than 50% of the length of the crossing span.

15. The conductors shall not be spliced in the crossing span nor in the adjoining span on either side.

16. The method of supporting the conductors at the poles, or towers, shall be such as to hold the wires, under maximum loading, to the supporting structures, in case of shattered insulators, or wires broken or burned at an insulator, without allowing an amount of slip which would materially reduce the clearance specified in paragraphs No. 9 and No. 10.

17. GUYS: Wooden poles supporting the crossing span shall be side-guyed in both directions, if practicable, and be head-guyed away from the crossing span. The next adjoining poles shall be head-guyed in both directions. Braces may be used instead of guys.

18. Strain insulators shall be used in guys from wooden poles carrying any power wire of less than 6,600 volts. Strain insulators shall not be used in guying steel structures, nor required on wooden poles carrying wires all of which are 6,600 volts or more.

19. CLEARING: The space around the poles, or towers, shall be kept free from inflammable material, underbrush and grass.

20. SIGNS: In the case of railroad crossings,

*Presented at the Boston Convention of the Association of Railway Telegraph Superintendents, June 26-30.

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if required by the railroad company, warning signs of an approved design shall be placed on all poles and towers located on the railroad company's right-of-way.

21. GROUNDING: For voltages over 5,000 volts, wooden crossarms, if used, shall be provided with a grounded metallic plate on top of the arm, which shall be not less than one-eighth inch (⅛") in thickness and which shall have a sectional area and conductivity not less than that of the line conductor. Metal pins shall be electrically connected to this ground. Metal poles and metal arms on wooden poles shall be grounded.

22. The electrical conductivity of the ground conductor shall be adjusted to the short-circuit current capacity of the system and shall be not less than that of a No. 4 B. & S. gauge copper wire.

23. TEMPERATURE: In the computation of stresses and clearances, and in erection, provision shall be made for a variation in temperature from 20° F. to 120° F. A suitable modification in the temperature requirements shall be made for regions in which the above limits would not fairly represent the extreme range of temperature.

24. INSPECTION: If required by contract, all material and workmanship shall be subject to the inspection of the company crossed; provided that reasonable notice of the intention to make shop inspection shall be given by such company. Defective material shall be rejected and shall be removed and replaced with suitable material.

25. On the completion of the work, all false work, plant and rubbish, incident to the construction, shall be removed promptly and the site left unobstructed and clean.

26. DRAWINGS: If required by contract, complete sets of general and detail drawings shall be furnished for approval, before any construction is commenced.

LOADS.

27 The conductors shall be considered as uniformly loaded throughout their length, with a load equal to the resultant of the dead load plus the weight of a layer of ice one-half inch (½") in thickness, and a wind pressure of 8.0 lbs. per square foot on the ice-covered diameter, at a temperature of 0° F.

28. The weight of ice shall be assumed as 57 lbs. per cu. ft. (0.033 lbs. per cu. in.).

29. Insulators, pins and conductor attachments shall be designed to withstand, with the designated factor of safety, the tension in the conductors under the maximum loading.

30. The poles, or towers, shall be designed to withstand with the designated factor of safety, the combined stresses from their own weight, the wind pressure on the pole, or tower, and the above wire loading on the crossing span and the next adjoining span on each side. The wind pressure on the poles, or towers, shall be assumed at 13 lbs. per square ft. on the projected area of solid or closed structures, and on one and one-half (1½) times the projected area of latticed structures.

New Book.

"Wireless Telegraph Construction for Amateurs." By A. P. Morgan. The intense general interest in wireless telegraphy is evidenced by the number of books being published on the subject, and as a rule they are excellent expositions of the art. This new book is all that could be desired for the beginner especially, and, indeed, for the technical and practical wireless telegrapher as well.

The subject is very thoroughly covered, and the language is so clear that the reading and study of the work is a course of instruction in itself. An idea of the scope of the book may be obtained from the chapter headings as follows: Introductory, Apparatus, Aerials and Earth Connections, Induction Coils, Interrupters, Transformers, Oscillation Condensers and Leyden Jars, Spark Gaps or Oscillators, Transmitting Helixes, Keys, Aerial Switches and Anchor Gaps, Hot Wire Ammeter, Oscillation Detectors, Tuning Coils and Transformers, Receiving Condensers, Telephone Receivers and Headbands, Operation.

The book is well illustrated with views of aerials and circuits of all kinds and of the instruments used in wireless telegraphy. The author's purpose is to give practical information for those who may wish to build for private or experimental use a set of wireless instruments which are more than toys but yet not so expensive as the commercial apparatus, and he has used the English language to good advantage in the attainment of his purpose. The book is well gotten up and shows pains and experience in its execution. The price is $1.50 per copy, and copies can be had from Telegraph and Telephone Age, 253 Broadway, New York.

Electric Interlocking Machines.—The General Railway Signal Company, Rochester, N. Y., has issued a supplement to its catalogue of its model 2 electric interlocking machine. The supplement deals with special parts for the control of the model 2-A dynamic indication semi-automatic signals as shown in catalogue, section 8, part 3, issued by this company.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

Miss Jane F. Powell of this office has been transferred to the United States Hotel office at Saratoga, N. Y., as manager and Mrs. S. Kirschbaum has been transferred as manager of the Fort Griswold Hotel, New London, Conn.

Mr. James Young has been appointed acting manager of the 65 Gold Street office, vice Mr. L. E. Westrope who is now acting manager of the 91 Wall Street office.

Mr. V. M. Sozzi has been appointed manager of the newly-opened office in the Heidelberg Tower Building, Forty-second Street and Broadway, New York.

Mr. J. Reynolds has been appointed manager of the office at 32 Desbrosses Street, vice Mr. V. M. Sozzi.

Mr. M. Silverstein has been appointed manager

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of the office at 1771 Broadway, vice Mr. A. K. Ainley, who has left the service.

Mr. Joseph Silberstein has been appointed manager of the office at 449 West Thirteenth Street, vice H. Weidler transferred to the commercial superintendent's office, New York.

PHILADELPHIA, WESTERN UNION.

Miss Nellie Hayes, chief clerk to general traffic manager, F. R. Webb, was married to Mr. M. A. Maloney on June 26. Miss Hayes was so well thought of that the employes presented her with a solid silver service. After her honeymoon she will reside in West Philadelphia.

Miss Bessie Sacks is on her usual summer vacation of three months in Maine, and Mrs. Katie Quinn, wife of the assistant night chief, is subbing for her.

The company is putting in large ventilators which it is hoped will afford some relief to the heated conditions in this office.

J. J. Richards, chief machinist of the Barclay printer, has resigned and his place has been taken by H. H. Swartz, who recently returned from South America.

Traffic chiefs from Baltimore and Washington, together with those from Philadelphia, held a conference here a few days, for the purpose of exchanging ideas and experiences. After the business session they were entertained on the roof garden of the Continental Hotel.

Mrs. Frank E. Maize, has been selected as chairwoman of the entertainment committee of the Old Timers at Atlantic City, N. J., September 5, 6, and 7, and she promises the ladies a good time.

ST. LOUIS AMERICAN TELEPHONE & TELEGRAPH.

Mr. Charles Gadberry, late chief test board man at Denver, Col., has been transferred to the test room at St. Louis.

Mr. Octavus M. Eaves has been transferred from the test room at St. Louis to Denver, as test board man.

Mr. J. C. Fallinger, late operator in the division office at St. Louis, has gone to Kansas City, Mo., to fill a similar position there, the division office having been removed to Kansas City.

Mr. M. M. O'Neill, of the test room has the sympathy of his many friends in the loss of his little daughter, who died on June 27.

Mr. A. H. Fredericks, recently of the Postal Company, is substituting in the test room during the summer vacations.

Mr. Sidney J. Ewald, late district plant chief at St. Louis, Mo., on the eve of his departure for his new post as district plant chief at Indianapolis, Ind., was the recipient of a handsome alligator traveling bag and toilet outfit from the St. Louis employes, as a token of their respect and esteem.

MOBILE, ALA., WESTERN UNION.

Mr. S. Boone has been appointed chief operator of this office succeeding Mr. J. D. Hester who retains the position of wire chief.

DALLAS TEX. WESTERN UNION.

Mr. H. P. Bond of this office has been promoted to be night chief operator, vice R. E. De Lay, resigned.

On his departure, Mr. De Lay was presented with a gold watch and fob by the operating force, as a token of their esteem.

Mr. J. B. Dillon, assistant wire chief days, succeeds Mr. Bond as wire chief.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

FOR SALE—A Bunnell galvanometer, complete in leather case, with resistance coils and connections for Wheatstone bridge measurements. Must be disposed of immediately to close an estate. Cost over $100.00. Will sell for $35.00. Address "Galvanometer," care Telegraph and Telephone Age, New York.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, combines fraternalism with sound business principles; it offers to the telegraph and telephone employe an absolutely safe form of protection, at a cost within the reach of all and lower than can be found elsewhere. Membership only open to employes in commercial or railroad telegraph or telephone service, and it is manifestly to the interest of those who are eligible and wish to secure life insurance within their means, to secure without delay a certificate for $1,000 or $500, or both, at rates based on present age.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 15. NEW YORK, AUGUST 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A NON-SPARKING POLECHANGER.

One of the factors which tend to lower the effectiveness of polechangers, is the tendency to sparking at the contact points when the current is broken, which is particularly pronounced in the walking-beam pattern.

This defect has thus far always been minimized by means of condensers employed for that purpose. It is obvious, therefore, that a polechanger which requires no extra condensers is a move in the direction of economy to say the least.

The accompanying diagram shows the connections of a new polechanger recently invented by Mr. Stephen D. Field, which seemingly is nonsparking up to 200 volts pressure. It is also a continuity-preserving contact-point device; contains no extra resistances and occupies less space than the old walking-beam apparatus.

Referring to the illustration, transmitter *I* is actuated by the local battery *L* which, when the key is closed, energizes the "kick-off" coil *I* as well as magnet *T*. Armature *A* is made of steel and receives a residual charge from magnet *T*, becoming selfpolarized, the charge changing with the change in direction of the current from the local battery.

When the key opens the "kick-off" coil *I* acts on the selfpolarized armature and sends it back with a force equal to that by which it was attracted. Spring *S* possesses sufficient tension to preserve the back contact unbroken in the event of jarring of the table when the local circuit is open. This form of spring is "atonic," that is to say, possesses no time of vibration and acts instantly, while at the same time the contacts thus made are singularly free from rebound.

The neutral coils *B*, *C*, are automatically cut out of circuit, while their discharge being in the same

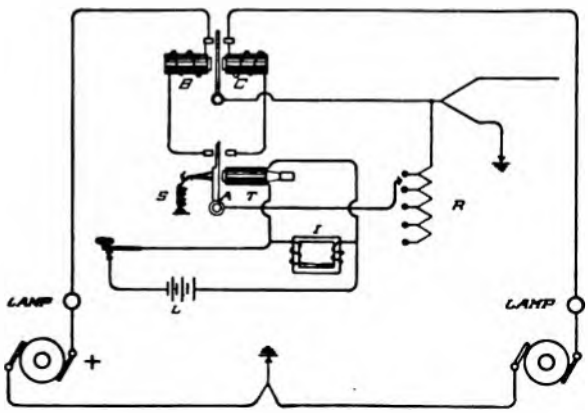

DIAGRAM OF NON-SPARKING POLE CHANGER.

direction as the current by which they are energized compensates for the momentary disturbance in the circuit during the period the spacing lever is occupied passing from one contact point to the other.

Mr. Field states that one of these polechangers has been in practical operation on a 325-volt circuit for more than two months and so far shows no tendency to spark.

While on the subject of polechangers it may be in order to say that that instrument, together with the carelessness with which it is frequently handled, has always been one of the weakest factors in the dynamo quadruplex system, owing to the break which occurs during reversals. The latter defect can be minimized by means of condensers and close adjustment of the contact points but unfortunately close adjustment of points is not always permissible on long circuits employing high voltages. Even when conditions favor a close adjustment it has been almost impossible to maintain the same because operators and others insist upon giving the lever wider play in order to hear the transmitted signals. This practice reduces the working margin of the neutral side of the quadruplex circuit.

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The true aim, therefore, is to devise a polechanger which will possess continuity-preserving contact-points and be free of tendency to spark. The apparatus herewith illustrated was devised with the aim of meeting both of these requirements.

Let us hope that another advance has been made in this line of progress. If we do finally succeed in obtaining a reasonably perfect instrument half the "troubles" now experienced by quadruplex attendants will be eliminated.

Recent Telegraph and Telephone Patents.

ISSUED JUNE 13.

996,580. Wireless Telegraphy. To C. M. Green, Lynn, Mass.

ISSUED JULY 4.

996,701. Automatic Cut-Out for Aerial Telephone Lines and the Like. To L. W. Carroll, Anamosa, Ia.

996,770. Combined Telephone and Electric Lamp. To F. J. Kerbel, New York.

ISSUED JULY 11.

997,288. Connecting Circuit for Telephone Exchanges. To Everett D. Hall, New York.

997,515. Signaling Apparatus. To Harry Shoemaker, Jersey City, N. J.

997,516. Receiving Apparatus. To Harry Shoemaker, Jersey City, N. J.

997,594. Telephone Repeater. To Willard Anderson, Longdale, Okla.

997,651. Telegraphic Recording Apparatus. To Thomas McClelland De Bingham, London, England.

997,756. Telephony. To George C. Cummins, Western Springs, Ill.

Personal.

Mr. Thomas A. Edison will sail for Europe, August 2.

Senor Don Camilio A. Gonzalez, director-general of the federal telegraph lines of Mexico, has resigned.

Mr. Louis E. McCabe, a former telegrapher, has been appointed superintendent of the Illinois Central Railroad at Mattoon, Ill.

Mr. Roy W. Howard, general news manager of the United Press Association, New York, is on a business trip to the Pacific coast.

Mr. C. R. Underhill is now connected with the Acme Wire Company, of New Haven, Conn., in the capacity of electrical engineer.

Mr. Fidel Villacorta has been appointed telegraph and telephone inspector for the first zone, Republic of Salvador, Central America, with headquarters at San Salvador.

Mr. G. H. Corse, Jr., of Shanghai, China, has arrived at San Francisco on a two months' visit and will arrive in New York about September 1. He will return to the Orient about October 15.

Mr. T. Buckley, chief electrician Post and Telegraph Department, Wellington, New Zealand, is in New York visiting the telegraph and telephone plants and other electrical industries. He will leave for England and the Continent in about three weeks and return home in November.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay, president, sailed for Europe July 11, to be gone six weeks.

Mr. J. F. Skirrow, associate electrical engineer, New York, is spending a vacation at Lake George.

Mr. C. F. Leonard, district superintendent, New York, is absent on his vacation.

Mr. C. A. Richardson, manager of the Boston office of this company, has been advanced to the position of district superintendent with headquarters at Boston, vice A. L. Edgecomb resigned.

Mr. E. P. Tully, manager of the New York office, has returned from Boston where he spent a few days on company business.

Mr. J. L. Fuller, manager of the North American Telegraph Company, at Duluth, Minn., was a recent executive office visitor.

Mr. Charles Many has been appointed manager of the 274 Columbus Avenue office, New York, vice Mrs. Scriver transferred to night duty at the Hotel Imperial.

Mr. Charles A. Richardson, recently appointed district superintendent of the Postal Telegraph-Cable Company, with headquarters at Boston, Mass., is a New Englander by birth, having been born in Newburyport, Mass., a little over forty years ago. He has been with the Postal company for more than a quarter of a century and has advanced from the position of operator to that of superintendent through every intermediate grade. He began his services with the company as operator in New York and remained there for fifteen years, becoming in the meantime traffic and wire chief. On January 1, 1900, he was appointed manager of the Boston office and held this position at the time of his promotion to the superintendency. His wide and long experience with the company and his personal qualities especially fit him for the important duties of his new position, and his appointment gives general satisfaction.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Messrs. Belvidere Brooks, general manager, G. M. Yorke, engineer, W. N. Fashbaugh, traffic engineer and W. C. Merly, secretary to the general manager are on a business trip in the West which will take them as far as Salt Lake City, Utah.

Mr. A. G. Saylor, general superintendent Eastern Division, New York, is on a short business trip to Maine.

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Mr. R. W. Whitehead, division plant superintendent at Denver, Col., has been transferred to a similar position in the Western division with headquarters at Chicago.

Mr. A. R. Porte, superintendent Great North-Western Telegraph Company, Ogdensburg, N. Y., was a recent executive office visitor.

Mr. S. G. Bentley has been appointed manager of the Mobile, Ala., office of this company to succeed Mr. C. R. Hughes resigned.

Mr. P. F. Dowd has been appointed manager of the office at 129 Columbus Avenue, New York, vice Mr. H. Putterman transferred to the main office.

Mr. A. J. Lemaire has been appointed manager of the 1647 Broadway office, New York, vice Mr. J. J. Shelley appointed solicitor in the territory of Mr. C. B. McCann, district commercial manager.

The cotton exchange office at New Orleans, La., has been enlarged and fitted out in the most modern manner through the efforts of Manager W. A. Porteous.

The Telephone.

Telephony in Japan.—The Japanese Department of Communications has decided to build a telephone line between Kobe and Arima.

Telephones in New York City.—The number of telephones in use in New York City July 24 was 420,688, an increase of 20,160 since January 1.

Submarine Telephone Cable.—A fifty-mile gutta-percha cable containing Pupin coils has been ordered for use between England and Belgium in telephone service.

Telephone Earnings.—The earnings of the American Telephone and Telegraph Company in the six months ended June 30 were $18,203,000, or about $600,000 more than in the corresponding period last year. Net earnings—$16,421,000—show an increase of $520,000. The surplus after deducting interest and dividends shows a decrease.

Texas Telegraph and Telephone Company Sold.—The Texas Telegraph and Telephone Company has sold its 500 miles of toll lines and other physical property to the Southwestern Telegraph and Telephone Company. The system embraces exchanges at Llano, Mason, Fredericksburg, Marble Falls, Sansaba, and Austin, Tex., and connecting toll lines.

Private Line Telephones in London.—One class of telephone business developed in London is that of the private line between two business houses or a man's office and his home, over which he can speak without going through an exchange, merely lifting his receiver to make a call. The service is fairly cheap, as it carries no operating expenses, and is further attractive because no royalties need be paid to the postoffice on this kind of connection.

Blind Telephone Operators.—The Bloomingville, Ohio, telephone exchange is operated by two persons, man and wife, who are totally blind, and it is stated that the service is very satisfactory to the patrons. An ordinary switchboard is used except that it has a small bar running beneath the drop shutters on the board. When a shutter drops the operator runs his or her hand along the bar until the shutter is touched. By touching the bar just beneath, the number is given the operator by raised figures. The plug is inserted, the desired number asked, and the hand is again run along the bar until that number is reached. Then the connection is made.

Radio-Telegraphy.

Wireless Station for Madrid.—The Spanish Government is about to erect a wireless station in the camp at Carabanchel, near Madrid, the range of which is 300 miles beyond the coast.

Wireless in Forest Patrol.—Assistant Chief United States Forester, Mr. William Potter, will recommend that wireless telegraphy be used instead of the telephone in connection with the patrol of the great forest reserves of the West.

Steering by Wireless.—A demonstration is reported to have been given on the Wannsee, Berlin, of the capabilities of a boat devised by Christian Wirth, of Nuremberg, which is steerable by means of wireless transmission. After the boat had been towed out far into the lake, and it had been ascertained that no one remained on board, the inventor manœuvered the boat by means of transmitting apparatus arranged on a terrace on the shore of the lake, where many spectators were present, including representatives of the army and navy.

Wireless Telegraphy in the Kongo.—Early this year a wireless-telegraphy expedition left Antwerp, Belgium, for the Kongo. This expedition was organized by M. Goldsmith, of Brussels, for the King of Belgium, who has allotted for the purpose part of a fund of 3,300,000 francs ($636,900) to be used each year for the improvement of the Kongo. The purpose of the expedition is to erect several experimental wireless stations and test the practicability of establishing wireless communication with Europe and extending the system throughout the territory of the Kongo. The expedition consists of six men, representing two different companies who are competing for the contract for the complete installation of wireless in the Kongo. These companies are the Telefunken of Berlin and the Radio-Telegraphie of Paris. The former system has been

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installed at Boma, about 55 miles up the Kongo River, and the Radio-Telegraphie system, at Banana, at the mouth of the Kongo. Two more stations are to be installed by the Telefunken, one at Leopoldville, about 220 miles up the river, and the other at St. Paul de Loanda, about 200 miles south of the mouth of the Kongo. The stations at Boma and Banana are now in operation and have succeeded in establishing communication with each other and with vessels at considerable distances at sea.

Municipal Electricians.

Superintendent of Milwaukee Fire-Alarm System.—The position of superintendent of the consolidated fire and alarm telegraph systems has been created in Milwaukee, Wis.

Fire Alarm System in Factory Buildings.—At the last session of the New Jersey Legislature an act was passed requiring that factory buildings more than two stories in height shall be equipped with fire alarm boxes on each floor, connected by electric wiring to a relay and from the relay to alarm gongs on all the floors, and to an annunciator on the ground floor and to properly located batteries.

Death of Superintendent S. W. Manning of St. Paul.—Mr. S. W. Manning, superintendent of fire alarm telegraph, St. Paul, Minn., was killed by coming in contact with a high voltage wire while investigating some trouble on fire alarm wires at the fair grounds in that city on July 19. Mr. Manning was chairman of the executive committee of the International Association of Municipal Electricians and his sudden death will probably affect the plans for the next convention of that association, which was to have been held in St. Paul, September 12-15.

Obituary.

John C. Lauber, aged 48 years, chief operator for the North American and Postal Telegraph-Cable Companies at Minneapolis, Minn., died at that place July 8.

George C. Pierce, vice-president of the Old National Bank, Grand Rapids, Mich., and an old-time and military telegrapher, died in that city July 15, at the age of 67 years. This is the nineteenth death among the members of the United States Military Telegraph Corps since September last year.

Cable Earnings.—The semi-annual report of the Anglo-American Telegraph Company, according to a London dispatch, shows a decrease of $188,970 in traffic receipts and an increase in expenses of $6,640. Regarding the agreement with the Western Union Telegraph Company the report says it is "settled in principle and detail, but not yet exchanged."

Some Observations on Telephone Transmission.*

BY J. L. MCQUARRIE, OF NEW YORK.

Since the beginning of the industry, telephone engineers and inventors have been confronted by two problems with respect to transmission: First, to increase the possible range of communication, that is, the distance over which it is possible to provide a satisfactory grade of telephone conversation; and, second, to cheapen the methods or means of furnishing this transmission.

The reason for development along each of these lines is at once obvious. The range of telephone transmission can be extended either by increasing the efficiency of the instruments employed, or by increasing the efficiency of the line. The cost of providing telephone facilities can be reduced either by improving the instruments or by cheapening the line while maintaining a given standard of efficiency, since for a given grade of transmission with improved telephone instruments, a cheaper type of line is possible.

One of the most interesting problems concerning telephone transmission is that of the repeater. The demand for an instrument which would relay the voice currents was very early appreciated, and much thought and labor have been devoted to this subject. The problem of the repeater consists really of two problems; first, a device for amplifying weak telephone currents without distorting them; secondly, an arrangement of circuits which will permit repeating both ways without switching. A repeater which accomplishes both of these objects has been employed on the long lines of the American Telephone and Telegraph Company for about six years. This repeater is capable of extending the range of transmission by 40 per cent., which means in terms of 210-pound copper circuit an increase in talking distance of about 250 miles.

The instruments which are employed for telephone transmission must of necessity be of a somewhat delicate nature because the energy with which they deal is of small magnitude. This, coupled with the fact that they are subjected to severe treatment in service, makes it essential that they be of substantial design, and that they be manufactured with great care. Uniformity in the product is also a very important factor—and these requirements are best realized under conditions which provide for the attention of trained experts of long experience.

It was to be expected that the first telephone lines should be similar to the then existing telegraph lines. Iron wire and grounded circuits constituted the early practice, and many years elapsed before proper attention was devoted to the lines to adapt them to the peculiar requirements of telephone service.

*Abstract of paper read at Boston Convention of Association of Railway Telegraph Superintendents, June 26.

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The first important improvement in the line plant consisted of the introduction of metallic circuits. This change was a measure of necessity to prevent disturbances caused by other electric circuits, as well as to avoid objectionable cross-talk between adjacent telephone lines.

The next improvement of importance in the line plant affecting transmission was the employment of hard drawn copper wire in place of iron. The limitations of iron wire were appreciated as soon as efforts were made to extend the range of transmission, and, while copper had previously been used for electric circuits, it was not suitable for aerial lines because it was too soft. Mr. T. B. Doolittle, an engineer in the employ of the American Bell Telephone Company, developed a process for manufacturing hard drawn copper wire, and this was the first important step toward the realization of long distance telephony.

As the business grew, and the demands for service increased, the congestion of overhead wires in cities led to the employment of cables. At first, as in the case of open wire lines, telephone cables were similar to the then existing telegraph cables. It was soon discovered, however, that owing to cross-talk or overhearing between adjacent conductors, it was not possible to extensively employ grounded telephone lines in cables, and metallic lines, with the two conductors twisted together, were found to be necessary. Practically the only satisfactory telegraph cable at that time was the one insulated with gutta percha. As this was very expensive and also, because of its high capacity, very inefficient, the problem confronting the telephone engineer at that time was the development of a satisfactory telephone cable. A large number of designs of cable were experimented with, but the final type which is now used under all conditions excepting the most severe submarine service, is the dry core paper-insulated lead-covered cable.

Following the development of the hard drawn copper wire, and of the dry core paper cable, some years later an invention was perfected which provided a means for not only extending the limit of telephone transmission, but also for effecting economies in the construction of the lines. Especially in the case of cables the economies are so great as to permit of the use of underground cables between points which, without this means, it would be practically impossible to connect by cables. This is of great practical advantage since overhead lines are notably subject to trouble from storms, while cables are free from such troubles. The invention to which I refer is the use of loading coils in the lines. This invention, more than any of the preceding improvements, marked the application of scientific principles to the problems of telephone transmission.

In the early records of tests on telephone transmission through cables are to be found statements to the effect that the transmission over cable circuits is equally as good as that over open wire circuits. As the length of cable was increased, however, it was soon found that this was not the case and that telephone transmission was reduced very much more by passage through cables than over a corresponding length of open wire line employing the same gauge of copper conductor. It was quite early recognized that, since the cable had very much larger mutual capacity than the open wire line, telephone transmission must be poorer over the cable. This conclusion developed from the scientific work performed by the late Lord Kelvin in connection with submarine telegraph circuits. What was not realized, however, for many years was the fact that in the case of open wire lines there was present to a considerable degree what may be termed, from the point of view of the telephone engineer rather than from a purely physical standpoint, a "corrective element," namely, the self-inductance of the line. In the case of cables, due to the fact that the two wires are very close together, corresponding to the non-inductive winding of a resistance coil which is so familiar to you all, the self-inductance of the circuit is a minimum. In case of the open wire line, the wires being 12 inches or more apart, the self-inductance has a comparatively large magnitude and is of great importance in telephone transmission. For instance, in the case of a No. 8 B. W. G. copper circuit, which has a conductor weighing about 435 pounds per mile, the range of commercial transmission between stations equipped with standard instruments is about 1,000 miles. If we could conceive of the wires being left 12 inches apart so that the capacity would be the same as at present, but in some mysterious manner the self-inductance of the circuit would be obliterated, the commercial range of transmission over this circuit would be reduced to perhaps 350 miles. I present this as an illustration of the importance of self-induotance in telephone circuits. Of course, if we could by some means avoid the capacity in a telephone circuit, we would prefer not to have the self-inductance present. If, however, the capacity is to be present, to obtain an efficient telephone circuit a comparatively large amount of self-inductance should also be present.

It was pointed out that to improve the transmission over open wire lines, the self-inductance that was present should be substantially increased, and that over cables, where the amount of self-inductance was almost negligible, it should be still further augmented in order to obtain the best results, and it was suggested that one method of increasing the inductance of the circuit would be to insert at intervals self-inductance coils, one winding in each of the two wires of a metallic circuit, or else a separate coil in each wire. No one, however, seemingly was able to show the telephone engineer how to introduce these coils into the lines.

Professor Pupin, by mathematical investigation, checked by experiments, about ten years ago furnished the telephone engineer with a practical plan for the employment of self-inductance coils which came to be known as "loading coils," this designation being derived from the analogy of the telephone circuit, with a string loaded with weights at intervals. Without pointing out the complete an-

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alogy between a motion of waves along a string and the telephone circuit, it may here be said that the telephone current is transmitted in the form of waves, and as these current waves progress along the conductor, they become altered in form as a result of counter influences inductively created by the current wave itself, and, inasmuch as the loudness and clearness of transmission is determined by the accuracy of reproduction of the wave form, and by its amplitude or height, the effect of the action of these inductive influences is to impair the transmission efficiency of the circuit. In seeking a remedy in the case, the object to be obtained is to preserve the original form and amplitude of the wave as far as possible. In the case of the string, it is found that for a given frequency, tension and amount of frictional losses, the larger the mass per unit length the greater the distance a wave of a given amplitude will be transmitted before being reduced in height by a given amount.

Loading has been very successfully employed on open wire lines and on underground and submarine cable circuits. An idea of the improvement in the transmission which results from the use of loading coils may be gained from the statement that where conditions favor loading, the 175-pound copper open wire circuit by loading is made equivalent in transmission efficiency to a 435-pound copper open wire unloaded circuit. In the case of cable, still greater relative gains in efficiency are possible; for example, a No. 19 B & S gauge cable suitably loaded has a higher telephonic efficiency than a No. 10 B & S gauge cable non-loaded. The No. 19 cable conductor weighs but one-eighth of the No. 10.

Phantoming has been employed in the past to produce economy in the telephone plant, because the phantom circuit provides a means for obtaining an additional line from two existing lines. It is but recently, however, that advantage has been taken of the increased efficiency of the phantom circuit to extend the range of transmission. The New York-Denver line lately placed in service, and the Boston-Washington underground cable now being laid, are examples of the latest advances in this branch of the art.

For a long time extensive use has been made of means permitting the simultaneous use of a line for telephony and telegraphy. If the two wires of a metallic telephone circuit are used for independent grounded telegraph circuits, we say the line is "composited;" but if the two wires of the telephone circuit are used in parallel as a telegraph circuit, we say the line is "simplexed." The compositing of a circuit does not limit the possibilities of also using it as one side of a phantom. The composited or simplexed circuits result in large savings, but whether the former or latter should be used depends upon a number of considerations. It may here be stated, however, that in general the use of simplexed circuits presents fewest complications, so that where an adequate supply of telegraph circuits can be obtained by this method it is not usual to resort to composited circuits. This should not be understood as implying that the use of composited circuits involves much complication, since, provided suitably designed equipment has been procured, the operation of composited circuits presents no difficulties. The transmission loss due to the addition of composite apparatus to the two ends of a circuit is just noticeable, being about 10%, or one mile of standard cable. The loss due to simplexing depends upon the type of simplex employed, whether "bridged retardation coil" or "repeating coil," and in each instance upon the type of apparatus used. In the case of small cheap repeating coils sometimes employed, the loss may be serious, being perhaps 50% or six or seven miles of cable.

In the case of composite apparatus especially, it is important that it should be carefully designed so that the telephonic efficiency will be a maximum and the chances of interference due to noise between the telegraph and telephone made a minimum.

(*To be continued.*)

Turner Monument Fund.

Interest in the Turner monument to be erected at Turner, N. Y., to commemorate the sending of the first telegraphic train order continues and contributions toward the fund are being received. As already announced the list is still open for further contributions, and will remain open for some time yet. In the meantime the committee is actively engaged on the plans with the co-operation of Mrs. E. H. Harriman's representative, Mrs. Harriman having very generously offered to meet the cost of the monument and the necessary cutting.

Those who have not sent in their subscriptions toward the fund are urged to do so at once in order to facilitate the work of the committee; and all interested in the railroad and railroad telegraph service should be represented in this interesting project. The fund committee consists of E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Sherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of TELEGRAPH AND TELEPHONE AGE, and the funds deposited with the Washington Trust Company, New York, as soon as received.

Contributions received up to date are as follows: Previously acknowledged, $1,641.25; W. B. Latta, El Paso, Tex., $2.00; Wm. Maver, Jr., New York, $2.00; total, $1,645.25.

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A Voltmeter Loop Test.

BY R. L. GILLES, TOPEKA, KAN.

In offices where there is no bridge the following test will be very useful in locating trouble in cables or telephone lines. The accuracy of this test will depend on the reading of the deflections and the resistance of the wires being equal.

The drop in voltage is directly proportional to the resistance; the resistance is directly proportional to the length of wire; therefore the drop in volts is directly proportional to the length of line.

Suppose we have a wire 100 miles long divided into 25-mile sections, as shown in Fig. 1. If the voltage between A and E measures 100 the drop

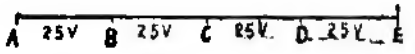

FIG. 1.—DIAGRAM OF ONE-HUNDRED MILE CIRCUIT.

from A to B will be 25 volts, also between B and C; C and D; D and E; likewise the drop will be 50 volts from A to C; B to D; and C to E. Suppose now this line to be doubled back at C to form a loop (as illustrated in Fig. 2) and grounded at D.

The drop from E to D is 25 volts and the drop from D to A is 75 volts. Then $25:75::ED:DA$, and also drop ED: length E to D:: drop EA: length E to A, therefore the distance E to D: drop ED:: distance E to A: drop E to A, or distance

$$E \text{ to } D = \frac{\text{drop } E \text{ to } D \times \text{distance } E \text{ to } A}{\text{drop } E \text{ to } D + \text{drop } D \text{ to } A}$$

The sum of the two readings will not always equal the voltage at the loop terminals, due to the resistance in the ground and the variation in currents when the voltmeter is shunted across the portions of the loop. This error cancels out, however, and the proportion is correct.

If using gravity batteries in this test, all wires should be taken off so as to get a steady reading.

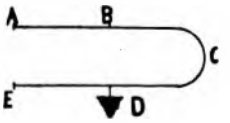

FIG. 2.—CIRCUIT LOOPED.

It is necessary that all equipment be taken from the line and a good short be put on beyond the trouble. An illustration of the test is shown in Fig. 3: Let X and Y be two lines and Y grounded at G and a short circuit put on the line at AB.

Reading $X' = 28$ volts

Reading $Y' = 12$ volts

$$\text{Distance } Y \text{ to } G = \frac{12}{28+12} \times 200 = 60$$

Length of loop $XABY = 200$ miles

or distance to the ground is 60 miles from Y.

In case X and Y are telephone wires and Y is crossed with a telegraph wire or other wire, the test would be the same, only using the crossed wire in place of the ground for taking the readings.

In case of a short circuit on a pair, if the short circuit be a solid one, this test can be used by put-

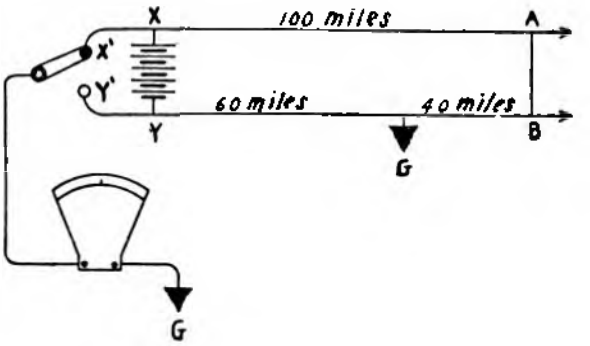

FIG. 3.—DIAGRAM OF TESTING ARRANGEMENT.

ting on a ground between the office and the short as follows:

$$\text{Distance around loop} = \frac{\text{Distance to ground} \times X' + Y'}{Y'}$$

$$= \frac{60 \times 40}{12} = 200 \text{ miles}$$

or the distance to the short circuit equals half of the loop distance, or 100 miles.

If possible, it is best to have the wires under test opened at a convenient place beyond the portion under test so as to remove any error due to another trouble on the same wires. The distance around the loop or to the ground, as the case may be, can be calculated from time tables or from a map drawn to scale.

Apparatus for Charging Storage Batteries.*

Storage battery installation may be of two general types—stationary or portable. Stationary batteries may be concentrated at a single location, near the power plant, as in the case of electric interlocking, or they may be distributed at a number of locations, and charged from a transmission line, as in the case of automatic signals. Portable batteries are charged at a concentrated location and distributed for use. Because of the nature of the battery applications, charging appliances for signaling may be divided into two types; first, those for charging a battery at or near a power plant; second, those for charging through a transmission line.

The first type will ordinarily require a minimum of about two volts and a maximum of about 175 volts, with a minimum of 5 and a maximum of 40 amperes. The second case will require, for transmission line of average length, from 500 to 600

* Abstract from paper presented by H. K. Ferguson, R. E. Russell and E. E. Kimball at the meeting of the Railway Signal Association, New York, June 14.

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volts, with any economical charging rate. This may, in some instances, be surprisingly low, with good results. The usual rate is from 4 to 10 amperes. In order to strike a fair average, we have based the following discussion upon a 5-kilowatt requirement, which is rather above, than below, the usual size.

If current can be secured from an outside source the purchase and operation of an expensive prime mover may frequently be omitted with a consequent reduction in initial and operating costs. If not there is, of course, no alternative except the installation of a complete power plant for battery charging.

The most desirable and economical condition and the one least frequently found in actual practice, is when direct current can be secured at a fair price, and at a practically constant voltage, equal to, or only slightly exceeding, the maximum voltage required for battery charging. In cases of this kind, regulation between the maximum and minimum potentials required may be readily accomplished by the use of suitable resistance or rheostats. No rotary machines are necessary, but only a simple switch-board panel, for mounting the proper instruments and regulating and protecting devices. Aside from this solution, any battery-charging plant will have to embody one or more of the following types of apparatus: (1) direct current-direct current motor generator set; (2) alternating current-direct current motor generator set; (3) mercury arc rectifier; (4) dynamotor; (5) rotary converter; (6) steam turbine driven unit; (7) steam engine driven unit; (8) gasoline engine driven unit; (9) switchboard panel; (10) battery charging panel.

The first five types are converters of electric energy, and, adapted for battery charging only with an external source of current. Types six and seven may ordinarily be taken to pre-suppose an existing steam supply, as the installation of individual boiler capacity would be prohibitively expensive. Type eight, the gasoline outfit, is the best practical outfit at present, where no external source of energy exists. Type nine is accessory to the preceding items, with the exception of the mercury arc rectifier, which requires no additional switchboard. Type ten is also accessory, but used only where several sets of duplicate battery at concentrated locations require special controlling devices not convenient for mounting on the panel.

Items four, five and six will not prove applicable to many railway signals installations. The dynamotor is a machine with two independent armature windings on the same core, each winding having a separate commutator. One field winding, only, is provided for both armature windings. Difficulties with the voltage regulation, and the fact that these machines are more or less special, and consequently rather expensive, have so far prevented their general application to signal battery charging. The rotary converter, in small sizes, is in little demand, and is likely, in consequence, to be rather high in price. Besides this, the impressed alternating current voltage bears a constant ratio to the direct current voltage generated by the rotary converter, so that the direct current voltage can only be changed by regulating the alternating current voltage. The ratio of alternating current to direct current is .6 for three-phase circuits, and .7 for single and two-phase circuits. Steam turbines, in small sizes, are not ordinarily as efficient or as easily regulated as the small steam engine. Also, they are not so frequently used, and, in consequence, are more expensive.

The field is thus limited to motor generator sets, rectifiers and steam engines, where electric or steam mains are available, and to the gasoline engines, for isolated locations.

The efficiency of the mercury arc rectifier is approximately constant at 80 per cent and of motor generator sets from 60 to 72 per cent, within limits at which they are operated. The thermal efficiency of the gasoline engine is much higher than that of the steam engine, but this advantage is usually much more than offset by the cost of fuel. In general, it may be said that the first cost of the mercury arc rectifier will usually be least; motor generator sets will be only slightly higher, with steam engine sets next, provided boiler capacity is available, and gas engine outfits most expensive. These types will rank in the same order as regards the amount of floor space required.

Motor generator sets are in common use for signal battery charging. They should be preferably direct connected, because more reliable, and requiring less floor space. They are readily adapted for all of the current and voltage requirements for signal work. While constant voltage is desirable for driving the motor, even trolley current, fluctuating rather widely, may be used, with a proper automatic voltage regulator. A particularly desirable method of operation may be obtained by using a small motor generator set for continuous operation, with the battery, load and generator all in multiple. This method, which is ordinarily known as "floating the battery," permits the generator to carry most of the load, and charge the battery at a slow rate. When heavy current output is required, and the generator voltage is pulled down, the battery helps out the generator by feeding into the circuit in parallel with it. The battery is also available as a reserve to carry the load for some time in case of a failure of the power supply or motor generator set. The shunt wound type of generator is best adapted for battery charging, because of convenience of voltage regulation, a primary essential for any generator for such service. Alternating current motors for alternating current-direct current sets should be three-phase if it is possible to obtain three-phase power service, because a three-phase motor is usually smaller, and less expensive, and the small sizes require no starting apparatus. Some phase-splitting starting device is necessary with any single-phase motor.

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In sets of odd size, where direct connection would be expensive, because of special speeds or sizes, an alternative is presented by the use of a "silent chain drive," which is reliable, requires much less floor space than any possible belt connection, and may sometimes prove economical in first cost, without increasing operating expense.

The mercury arc rectifier with the improvements made in recent years is proving to be one of the most valuable devices for battery charging. These rectifiers are complete in themselves, requiring no apparatus not included within the smallest floor space required for any battery charging outfit. They are made in standard sizes ranging from zero to 175 volts, direct current, and from 10 to 40 amperes. This range of voltage limits the rectifier at present to battery charging at concentrated locations, and for short transmission lines, as its maximum voltage is not high enough to operate a long series charging line successfully, even at a low charging rate. Ordinarily the rectifier is designed for operation on 60 cycles, at 110 volts or 220 volts, single-phase alternating current, but it may readily be adapted for other voltages, or frequencies down to 25 cycles.

Steam driven units can be obtained in small sizes, adapted for steam pressure as low as 80 pounds. These sets are useful wherever steam pressure may be had. Steam sets are ordinarily provided with a heavy fly-wheel and closely regulating governor, which results in close speed regulation, and practically constant voltage. Consequently, no automatic regulators of any sort are necessary or advisable.

With the present cost of fuel, gasoline engine sets are more expensive in operation than any of the previously mentioned outfits. They require some cooling apparatus beside the engine and generator. With slight modifications, they may be operated by either gasoline or gas. They are built with various numbers of cylinders, for either two or four cycle operation. When reliably built, and of good design, the gasoline engine is, however, undoubtedly the best, and practically the only economical prime mover for battery charging service at isolated locations.

New Form of Electric Cable.

Mr. J. H. Cuntz, of Hoboken, N. J., has been granted two patents on a special form of cable and on electric wave transmission over underground and submarine cables.

The first patent relates to the construction of a cable for wholly or in part counteracting the effects of capacity by increasing the inductance proportionately.

By Mr. Cuntz's method of construction a cable can be produced with an inductance as large as required under any given conditions, and what is more important, the amount can be predetermined and the elements of the cable so adjusted as to secure the proper amount in a simple and practicable manner.

In the construction of the cable the conductor is carried in a helical path on a paramagnetic core which increases the inductance of the line.

The last three claims of the patent read as follows:

16. A long-distance electric transmission line having a non-current-carrying core, and an insulated conductor wound in an open coil about said core so as to neutralize suitably the electrostatic capacity of the line.

17. An electric circuit comprising a conductor substantially continuously wound to produce inductance sufficient in amount to suitably counteract the capacity of the circuit, and a magnetizable core for said circuit.

18. In an electric circuit, the combination of a magnetic core, a conductor so disposed about said core as to introduce inductance in a continuous manner throughout the length of the circuit so as to counteract adequately the electrostatic capacity of the circuit, and insulating material surrounding said conductor.

Mr. Cuntz's second patent relates to the distribution of inductance in such a manner as to counteract the effect of distributed capacity, more particularly on metallic circuits, by means of the specially constructed cable described. Such circuits may be used for telephone, telegraph, power transmission and all other purposes.

The last two claims of the patent read:

4. In an electric circuit, outgoing and returning conducting wires substantially continuously wound, in opposite senses, to create inductance sufficient in amount to suitably counteract the capacity of the circuit, and a magnetizable core for said wires extending substantially throughout the length thereof, the said core being metallically discontinuous.

5. In a system of telephone transmission, a complete metallic circuit, a magnetic core extending substantially throughout the circuit, and windings of the induction coil of the microphone transmitting apparatus disposed about said core.

Unbreakable Insulators.—An insulating substance of great toughness is being introduced in England and the claims made for it should appeal to telegraph and telephone companies. It is claimed that insulators made of this special composition are bullet-proof as well as unbreakable. The material is weather-proof and almost indestructible, and the screw threads are accurately cut, so that they are easily fitted to the supports, without the use of cement. The insulation resistance of the insulators, as tested in water at Faraday House, was over half-a-million megohms after seven days' immersion in brine, the insulation resistance was about 100,000 megohms, and on applying an alternating pressure at 50 cycles per second the insulation was not broken down until pressures exceeding 13,000 volts were attained. Fired at with shot-gun the insulators showed merely superficial injuries.

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Improvised Repeaters.

BY C. A. COOK, PORTLAND, ORE.

The writer was called upon to supply, at short notice, single-line repeaters in addition to the regular equipment. There being eight or ten Atkinson half sets at hand these were adapted for use as full-sets in the manner shown in the accompanying diagram. There was, however, added to each a three-point switch, the lever of this switch being connected to the ground terminal of the transmitter coils. The left disk of the switch was connected to the ground wire which was removed from the ground terminal so that when the lever was thrown to that side the set was practically unchanged. The right disk of the switch was connected to the regular local feed wire of say 26 volts.

In the illustration only one half set is shown, the other half being an exact counterpart and connected with it by means of the connecting cord shown at the right of the diagram.

To use any two half-sets thus equipped as one full-set, insert their duplex wedges in a shorted jack as shown, and the two half-sets then will operate together as one full repeater; their main-line single wedges of course being inserted in the lines to be repeatered.

The convenience of this arrangement is manifest inasmuch as the half-set main-line wedges are usually distributed along the different sections of the switchboard, and their duplex wedges grouped in front of the loop-board, where any two may be coupled together in the spare-jack. This jack, it will be seen, serves to connect the face of one duplex wedge to the back of the other, and vice versa, thus placing the transmitter of one set under control of the relay of the other set.

This makes an excellent, quick-breaking full-repeater, and one that may be relied upon on bad-working wires; and it has given such good results that a number of sets have been similarly equipped. Another point in favor of this arrangement is that its use as a full repeater does not in the least detract from its utility as a half-set.

Multiplex Telegraphy and Telephony.

At the recent convention in Chicago of the American Institute of Electrical Engineers, Major George O. Squier read a paper on "Multiplex Telephony and Telegraphy by Means of Electric Waves Guided by Wires."

Major Squier gave the results of experiments made by him at Washington to determine the feasibility of superposing on an ordinary telephone line one or more separate telephonic circuits actuated by high-frequency currents that would not interfere with one another. His idea was to use frequencies above the limit of audibility, viz., from 15,000 to 100,000 cycles per second. The telephone line used in the experiments had a length of about seven miles. It was a twisted pair carried in lead-covered cable from the Bureau of Standards through three telephone exchanges to the laboratory of the Signal Corps. With the exception of 3,400 feet, all the cable was underground. The line resistance was 776 ohms, and the capacity 0.69 microfarads. A specially constructed 100,000-cycle generator was used as the source of the high frequencies. The first tests showed that frequencies from 30,000 to 100,000 could be impressed on the line without being detected in the ordinary telephone receivers. The line was then equipped with the ordinary telephonic apparatus at each end and a high-frequency equipment of the wireless type was also placed at each end; the latter included a microphone transmitter and a perikon crystal detector. By means of a double throw switch an interrupter could be substituted for the microphone, thus permitting high-frequency telegraphic signals to be sent and received. Speech was transmitted and received successfully over one of the wires with ground return. At the same time the ordinary low-frequency telephone equipment was successfully used without interference from the high-frequency currents, thus achieving true duplex telephony. By the insertion of tuning inductances and condensers the transmission was improved and cross-talk and earth disturbances eliminated. An audion detector was used in the final experiments and both bridging and series arrangements successfully used. By holding one telephone receiver to one ear and the other receiver to the other ear, the receiving operator could hear two entirely different conversations simultaneously over the same pair of wires. Duplex-diplex Morse and high-frequency telegraphy was also carried on. Many measurements of electric waves at frequencies from 20,000 to 100,000 were also made and numerous resonance curves drawn for the open and closed line. The author in concluding his paper called attention to the fact that his system is not intended to supplant, but rather to supplement, the present systems. He contended that his experiments show the value of a metallic wire guide for the energy of electric waves, thus furnishing a directive wireless system and solving the problem of interference of messages, at the same time reducing the distortion of speech.

Wireless Telegraph Waves from the Sun.—In a certain sense every shining star in the heavens is constantly sending out spherical electromagnetic waves within the range of visual perception, besides probably many longer waves, outside of that range. In this particular sense we are constantly receiving wireless telegraph waves from every visible orb, and the message received is not news but light. Moreover, since all animal energy is derived from plants, and all plants build up their substance from the energy contained in the sunlight they receive, it follows that all our muscular energy is derived indirectly from wireless telegraphy waves received from the sun.—From *Wireless Telegraphy and Wireless Telephony*, by Dr. A. E. Kennelly.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

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Canada 2.50
Other Foreign Countries 3.00

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August 1, 1911.

Seeking Employment in New York.

It seems to be the ambition of many operators, particularly young men, to obtain a position in the New York office, thinking, probably, that a course of experience in this city will finish off their telegraphic education. Many such operators are possessed with the idea that to be able to say that they have worked in the New York office gives them a telegraphic standing that they could not otherwise obtain, and that it is a sufficient recommendation for a position elsewhere.

To those who have such yearnings we would offer a word of caution, especially to men who have families. We have frequently been asked for advice by operators and even managers in small towns who have families and are relatively well off in their own communities as to the advisability of their coming to New York. To such requests we have only one reply to make and that is: "Don't"—with a big D and the other three letters big as well. To make such a move is rank folly. The thought is almost unbelievable that a man with a family, who possibly has attained a position of prominence in his little town could for a moment entertain the idea of surrendering a life of comparative peace and happiness for one of turmoil and discomfort, but it is true that there are such cases.

It is hardly necessary to state that a man with a family in New York receiving the ordinary salary paid to operators will find it uphill work indeed to live as comfortably as he could on less salary in a smaller town.

With young unmarried men the case is slightly different but even they should move with caution. An operator in a small community can, if he has any ambition at all, become prominent and influential, but in crowded cities like New York the individual cannot make himself felt to so great an extent. If wishing to get a taste of New York life come for a visit only and not with the intention of making it a place of permanent residence.

Cupid in Telephone Exchanges.

Telephone companies frequently complain of the losses in the ranks of their female operators by marriage, and strange as it may seem, the companies themselves are largely to blame for this state of affairs, if one may judge from the employment qualifications of a company in a western city. This company requires applicants for positions as operators to be of good character, have good sight, good hearing, a pleasant voice, good health, obedient, honest, industrious, polite, of good temper and have no disposition to pry into or discuss the affairs of others. It is no wonder that telephone companies are hampered by cupid when they employ such perfect specimens of womanhood and their subscribers find it out.

Airships and Wires.

Another strong argument in favor of placing telegraph and telephone wires underground is found in the increasing use of balloons and airships. At first glance the relationship between the two ideas seems to be remote, but when a balloon or an airship gets entangled with an aerial line it supplies some food for thought. Such an occurrence actually took place recently in a western town. The time may soon come when airships will be so numerous that telegraph and telephone companies will, for their own protection, be compelled to surrender the air to the human birds and fall back entirely upon the tender mercies of mother earth.

High Tension Wire Crossings.

We conclude in this issue the report of the High-Tension Wire Crossings Committee of the Association of Railway Telegraph Superintendents which was submitted to and approved by that body at the recent Boston convention. This report is an important one and represents the results of the careful joint deliberations of committees representing the National Electric Light Association, the American Railway Engineering and Maintenance of Way Association, the American Railway Association, the American Institute of Electrical Engineers and the Association of Railway Telegraph Superintendents, but strange as it may seem the telegraph and telephone companies—really the ones most vitally interested—were not represented. These, however, have been invited to participate in the further work of the committees.

All interests concerned should co-operate in the effort to standardize the practice of providing pro-

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tection against physical crosses between high and low potential wires, such for instance as electric light or electric railway wires and telegraph and telephone lines. Such crosses are at all times a positive menace to life and property, and the object of the work of the joint committees has been to minimize these dangers by removing the cause as far as possible.

The recommendations of the committee are very complete and seem to provide for every contingency. The report in itself, however, is ineffective; its provisions must be carried into practice and every company concerned should cooperate in the work.

Automatic Systems in Handling Cable Business.

Considerable light was thrown upon the practical operation of the Wheatstone system, the siphon recorder and the automatic printing system as used by the Western Union Telegraph Company, in the discussion by Mr. A. G. Saylor of Mr. Maver's paper read at the recent Boston convention of the Association of Railway Telegraph Superintendents on "High Speed Automatic Perforators, or Perforator Receivers," and printed in the July 16 issue of this paper. Relatively few telegraphers have any practical knowledge on the modern methods of operation of these systems, and for this reason the information imparted by Mr. Saylor will be welcome. Another reason that will render it more valuable is the fact that it comes from a high official of the Western Union Telegraph Company and is therefore reliable and authentic.

The keynote of Mr. Saylor's remarks is speed, and it is interesting to learn how the reduction of time-losses has been accomplished in handling cable business. It is pointed out that these improvements do not always mean economy in cost of operation, but they do effect a saving in time which is the factor of prime importance in cable service.

Principles of Conduct.

To achieve success a man should first convince himself that he is in a congenial business. Whether it be a trade or a profession—both are honorable and profitable—let him satisfy himself above all else that it enlists his personal interest. If a man shows that he has his work at heart, his success can be relied upon. Personal interest in any work will bring other things; but all the other essentials combined cannot create personal interest. That must exist first; then two-thirds of the battle is won. Fully satisfied that he is in the particular line of business in which he feels he has a stronger, warmer interest than in any other, then he should remember:

First—That, whatever else he may strive to be, he must be absolutely honest. From honorable principles he never can swerve. There can be no half-way compromise.

Second—He must be alert, alive to every opportunity. He can not afford to lose a single point, for that single point may prove to be the very link that would make complete the whole chain of a business success.

Third—He must ever be willing to learn, never overlooking the fact that others have long ago forgotten what he has still to learn. Firmness of decision is an admirable trait in business. The man whose opinions can be tossed from one side to another is poor material. But life is full of errors, and caution is a strong point.

Fourth—If he be wise he will entirely avoid the use of liquor. If the question of harm done by intoxicating liquor is an open one, the question of the actual good derived from it is not.

Fifth—Let him remember that a man's strongest recommendation is his respectability. Some men, apparently successful, may be flashly dressed, loud in manner, disrespectful to women and irreverent towards sacred things. But the man who is respectable always wears best. The way a man carries himself in his private life oftimes means much to him in his business career. No matter where he is, or in whose company, respectability, and all that it implies, will always command respect.—*The Pacific Telephone Magazine.*

Wireless Telegraph Detectors.

When the high frequency currents of a wireless system strike the detector a weak pulsating direct current is set up. This action is due to a peculiar rectifying property of the mineral. The receiving range of a station is not as much dependent upon the aerial system as it is upon the adjustment of the tuning circuits and the detector.

Certain minerals and crystals, principally members of the carbon and sulphur groups, possess the peculiar property of rectifying electrical oscillations and converting them into a pulsating direct current. These crystals conduct the current better in one direction than in the other. In the case of a current having a potential of ten volts and applied to the ends of a carborundum crystal the current may be one hundred times greater when flowing in one direction than when flowing in the other. This ratio decreases as the voltage is raised, for with 25 volts it may be only about forty times greater. The crystals when properly inserted in the aerial circuit are enabled to rectify the oscillations and produce sounds in the telephone receivers without the aid of a battery.

Mr. J. M. Barnes, of St. John, N. B., writes: "In renewing I wish to say that the AGE is very helpful in keeping me in touch with the changes and improvements connected with telegraphy, and the articles by Mr. Jones each month should be read and studied by all who purpose making their living at this business."

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Revised Instructions on Quadruplex Installation and Operation.

The engineer of equipment of the Western Union Telegraph Company, Mr. W. E. Athearn, has issued revised instructions pertaining to quadruplex installation and operation,* which are printed in the June number of the *Journal of the Telegraph*.

The line resistance box which was originally intended to contain only one set of resistance coils for use in the main line under certain specified conditions, has been redesigned so as to include another set of similar resistances to be used in the artificial

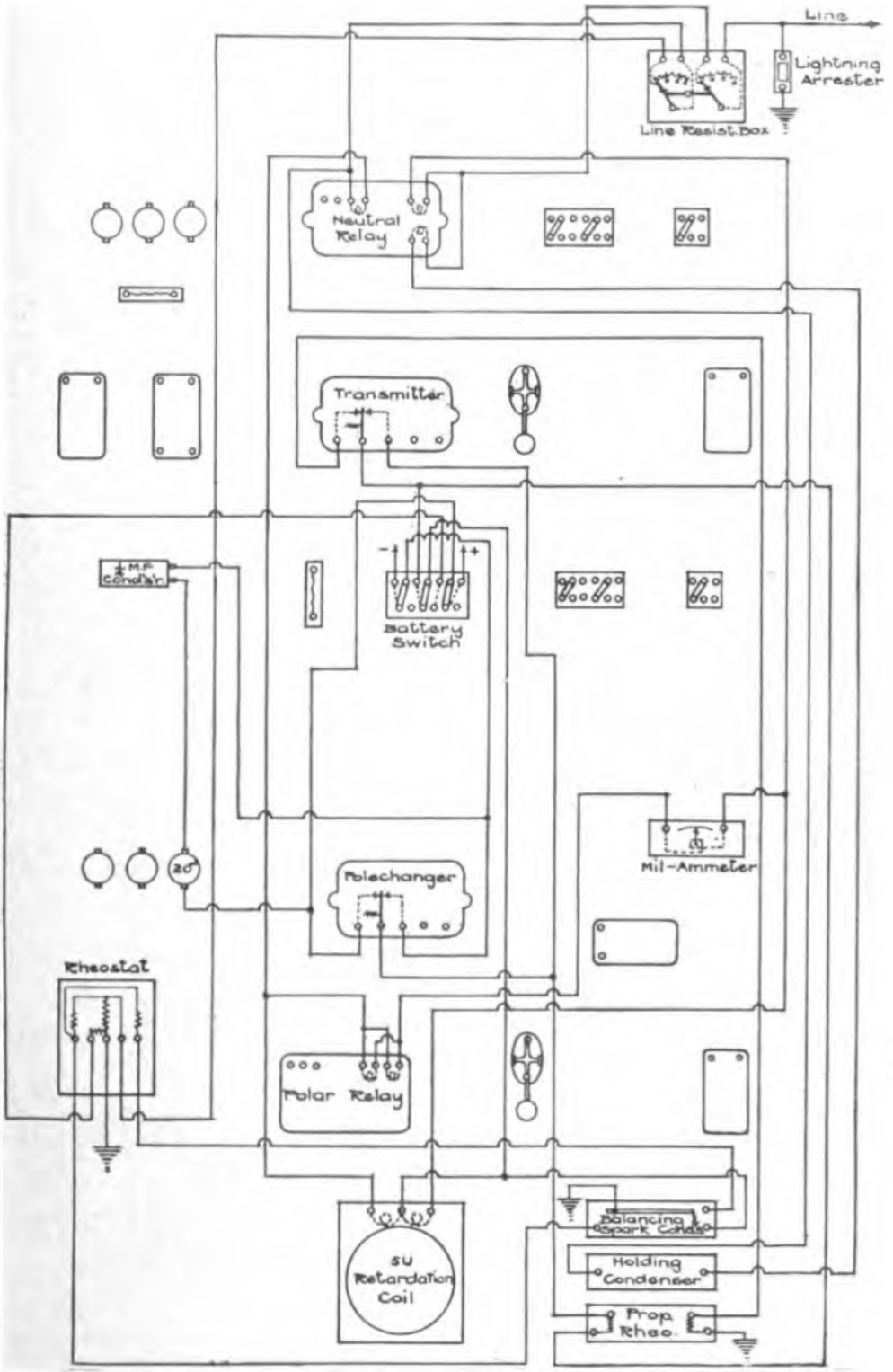

FIG. 1.—WIRING DIAGRAM OF MAIN LINE CIRCUITS

*See Telegraph and Telephone Age, March 16 and April 1.

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line as compensation for such added line resistance.

New instructions are given covering the "Centering of Polar Relay," "The Transmitting Appliances," "Transmitting Apparatus Adjustments," "Line Resistance Box," and "The Quadruplex Repeater."

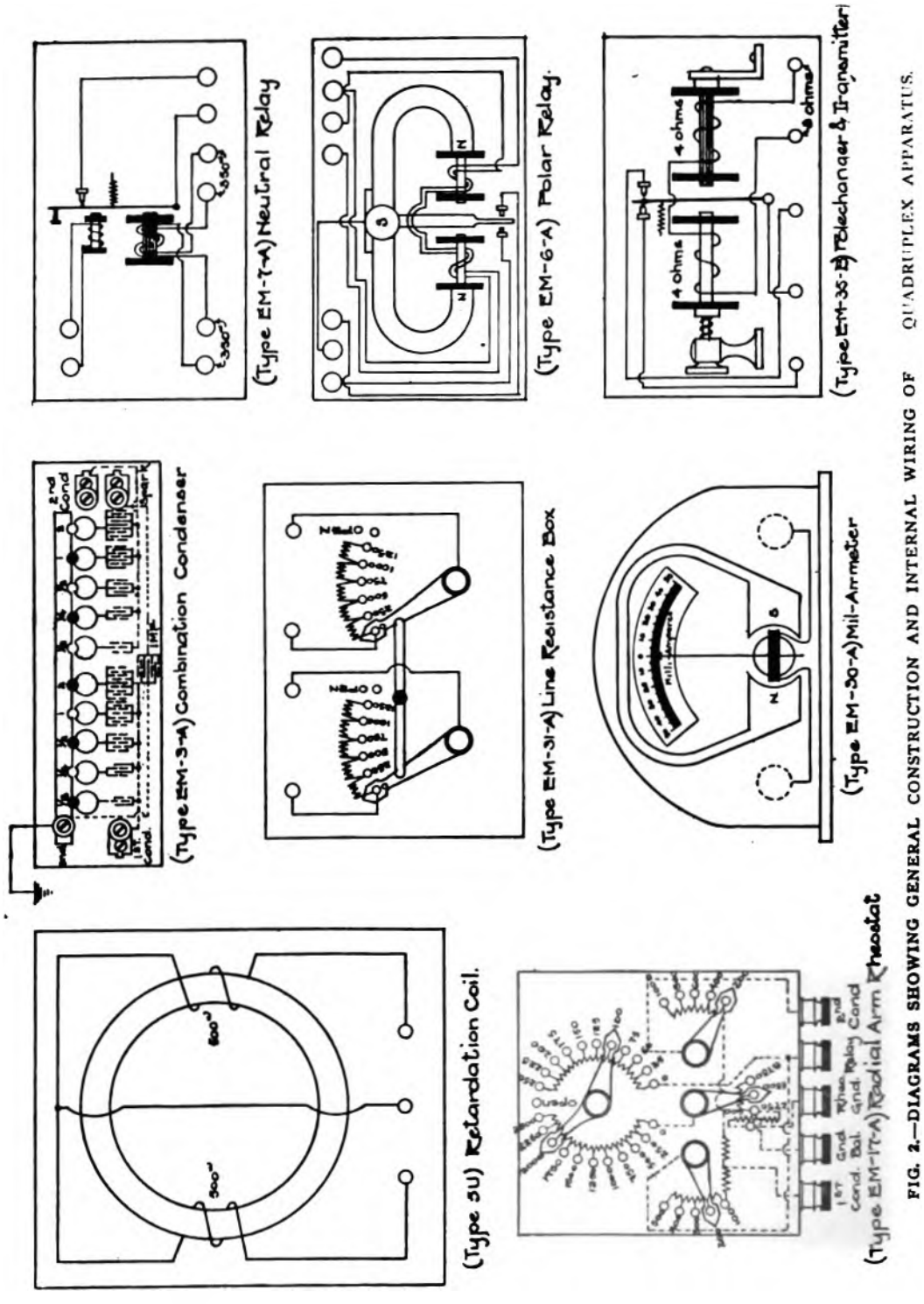

FIG. 2.—DIAGRAMS SHOWING GENERAL CONSTRUCTION AND INTERNAL WIRING OF QUADRUPLEX APPARATUS.

CENTERING OF POLAR RELAY.—In order to center the relay (which course is always advisable in the initial stages of adjustment), first throw the double lever of the line resistance box (Fig. 1) over to its extreme right hand position, which will open both the main and artificial lines. Then set the armature lever midway between the relay cores, leaving an air gap of about 1-32 inch on each side. Afterwards adjust the limiting stops until the play of the

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lever between them is just sufficient in amount to prevent sticking, and ensure clear breaking of the contact points.

THE TRANSMITTING APPLIANCES.—The form of polechanger and transmitter shown in Fig. 2 is specially designed for rapid action, and to minimize the "interval of no current" when acting in the capacity of current reverser.

The armature of this instrument is placed between two short electromagnets connected in series with each other, one of which (that to the left of the armature) is provided with a solid iron core enclosed in a copper cylinder or jacket so as to make it less active than the other electromagnet, the core of which is of laminated soft iron in order to hasten the rise and fall of the magnetism developed therein. The movements of the armature lever are greatly accelerated by this arrangement, which reduces the

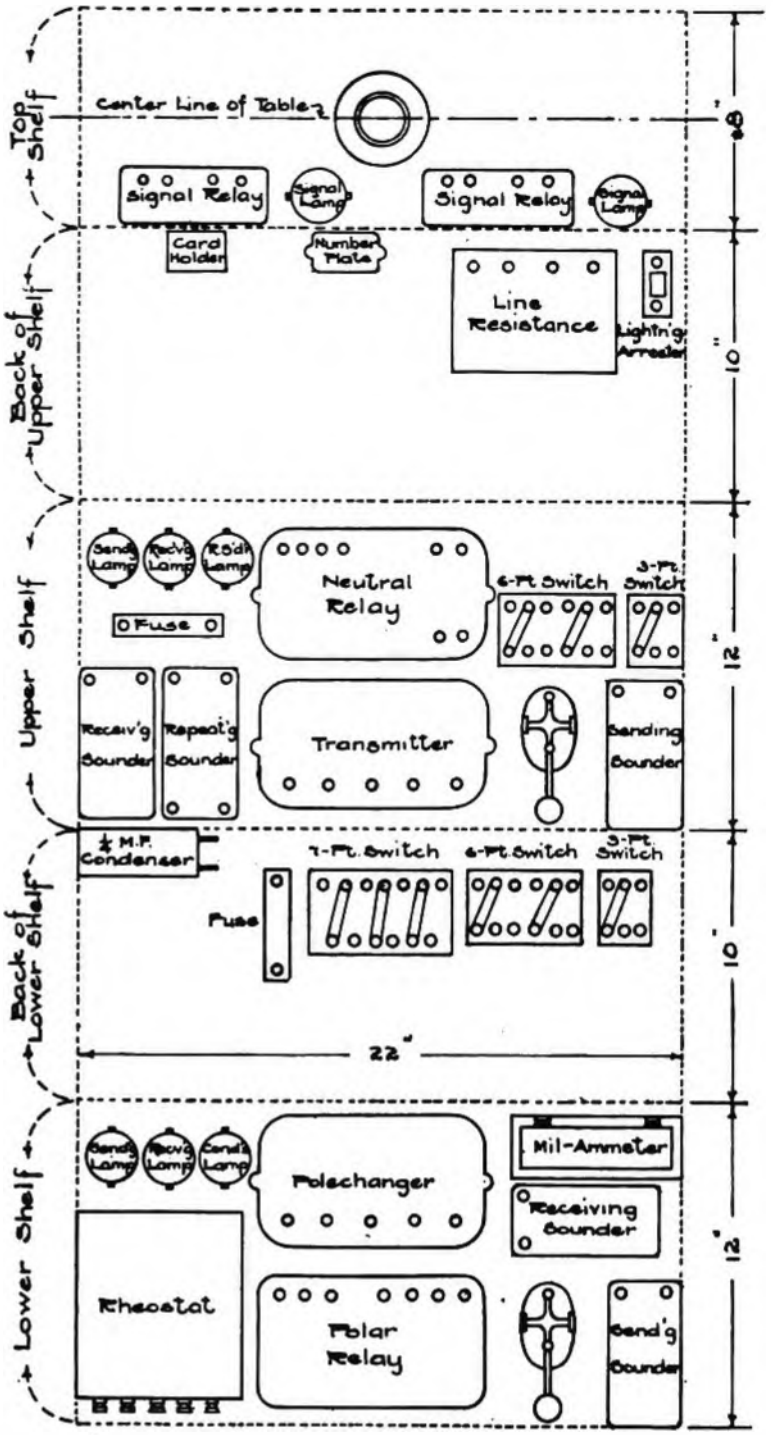

FIG. 3.—DIAGRAM SHOWING LOCATION OF APPARATUS ON REPEATER TABLES.

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time interval in the passage of the armature between its battery contacts and correspondingly increases the working margin of the neutral relay at the distant station.

an ordinary receiving blank) between the armature and core of the right hand electromagnet, which latter should then be permanently fixed in that position.

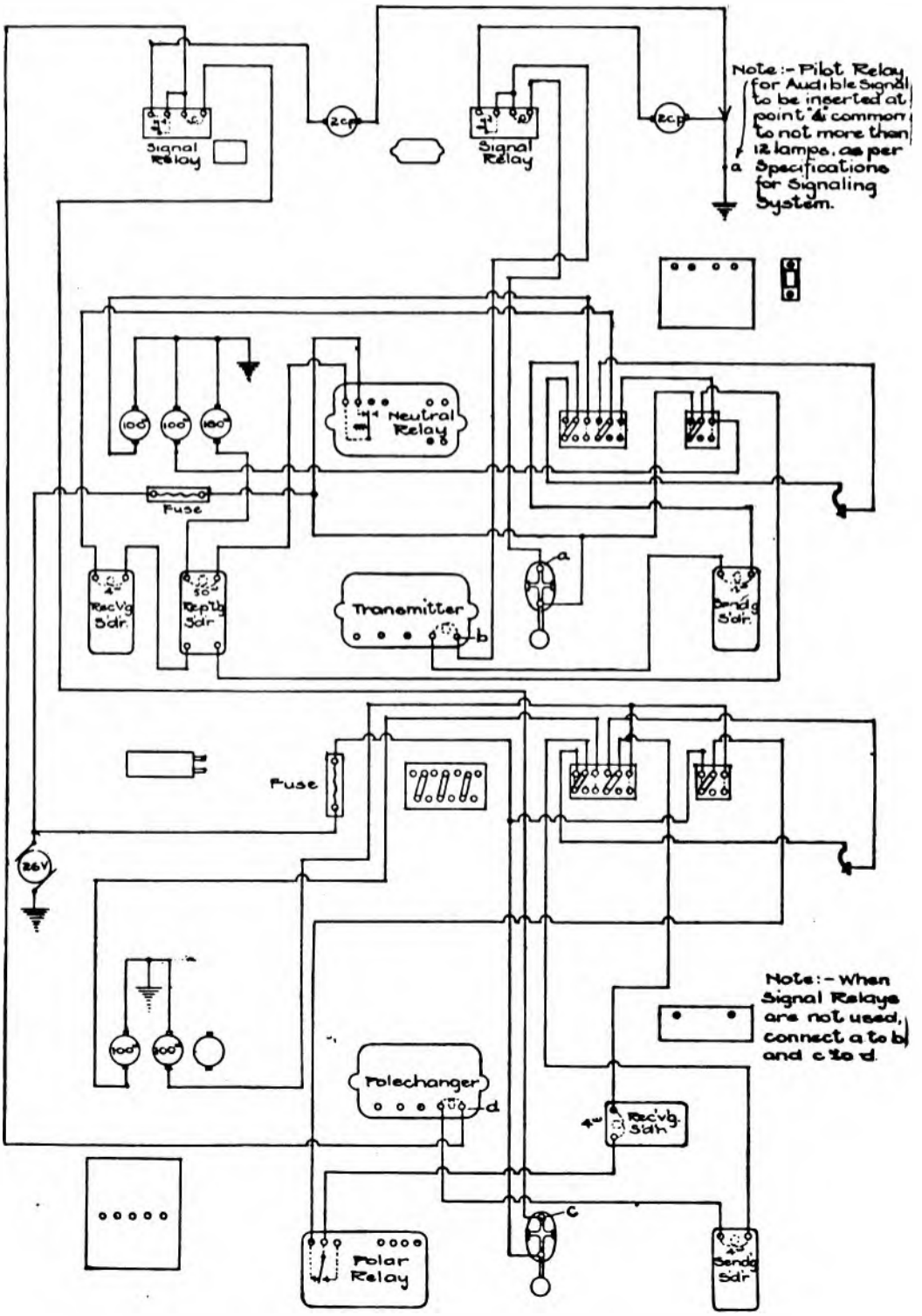

FIG. 4.—WIRING DIAGRAM OF QUADRUPLEX LOCAL CIRCUITS.

TRANSMITTING APPARATUS ADJUSTMENTS.—The coil adjustments of both polechanger and transmitter should initially be such as to leave an air space of about 1-64 inch (or not less than four thicknesses of

The other electromagnet is arranged to move back and forth in the usual way, but its most effective position will generally be found at a point where (with the local circuit closed) the armature rests in-

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differently on either of its contact stops when placed there by the finger.

The play of the polechanger armature between its battery posts should be as small as is possible without creating a tendency to "arc," which is liable to occur at the breaking of battery contact. To minimize such tendency, a small ¼ m.f. condenser in series with a 20-ohm resistance lamp is now placed across the battery leads (see Fig. 1).

The sparking that appears at the making of battery contact represents the static discharge from the main and artificial lines. The particular object of the spark condenser is to open up an inductive path to ground for this discharge, the effects of which are thereby diminished at the contact points of the polechanger.

Line Resistance Box.—This box (shown in the upper right hand corner of Fig. 1) contains two separate and independent sets of graduated resistance coils, each aggregating 1250 ohms, and so arranged that resistances in equal amounts can be simultaneously cut into or out of both the main and artificial lines by one and the same movement of the double lever with which the box is provided.

The primary object of the auxiliary line resistance is to afford a means for increasing the electrical length of short quadruplex circuits, in order that the latter may be successfully operated on potentials ordinarily used in connection with comparatively long circuits.

It may also be employed to advantage in reducing the strength of earth currents on lines between whose terminal ground plates potential differences exist that would be detrimental to the working—particularly of short quadruplex circuits.

The use of this resistance may occasionally be desirable on the longer circuits under such changeable weather conditions as might seriously affect the working by disturbing the line balances. The insertion of the line resistance under these circumstances, would have the effect of removing the main line wire from the immediate vicinity of the home apparatus, which would then be less susceptible to the alterations in magnetism brought about by leakage variations.

Whenever a change of this character has been made in the line resistance, the distant office should be apprised of the fact in order that any rearrangement of the balance rendered necessary thereby may be suitably effected at that office.

The Quadruplex Repeater.—The repeating apparatus is in every way identical with that at the terminal stations, and the location of its various parts upon the multiplex table at either a terminal or repeater station is specifically indicated in Fig. 3.

The Use of Quadruplex Sets for Duplex Working.—When the weather conditions are such as to render quadruplex working impossible, the circuit may be operated as a polar duplex by closing the second side transmitter at both stations.

To avoid the overheating of apparatus by excessive current under these conditions a sufficient amount of resistance should be added to the circuit by means of the line resistance box to reduce the incoming current to a value that will produce a deflection of not more than 10° on the mil-ammeter scale.

If the leakage along the line be fairly well distributed this extra resistance should be split up between the two offices, equal amounts being preferably inserted at each end of the circuit; but where the insulation of the line is low at one end, and more or less normal at the other end, the larger portion of this resistance should be inserted at the station nearest which the bad weather conditions prevail.

Local Wiring of Quadruplex and Duplex Sets.—Attention is called to the fact that under the old method of local wiring, the compensating resistance lamps are—at many offices—located in the extension cords which serve the purpose of connecting together such different sets of multiplex apparatus as may be required to work into each other.

In the new wiring scheme, these resistance lamps form part of the set at the multiplex tables, an arrangement that makes it impracticable for any of these sets to repeat into other sets that may happen to be differently wired, and vice versa.

In order to obviate this difficulty and bring about a more uniform system of local wiring, it will be necessary at those offices, which are, or may be equipped with the new quad apparatus, to effect such changes in the old style wiring as will make it conform with the new standard arrangement shown in Fig. 4.

Determining the Condition of Storage Batteries.—For determining the condition or degree of charge for a storage battery the voltmeter alone is not a reliable instrument; it is indispensable in the switchboard operations, and will surely indicate abnormal and accidental conditions, but cannot readily detect variations and slight defects in individual cells. If the battery is a fairly constant potential device, the voltmeter cannot be expected to find considerable or even readable variations in potential. The case is like that of a high water-tank or reservoir; this, too, is for maintaining a constant pressure, and an ordinary dial gauge could not be depended upon to give a reliable indication as to whether the reservoir was almost full or almost empty. If, suddenly, the gauge indicated zero, the tank would be known to be empty, but that condition is of course to be avoided. A gauge floating on the water is a simple and reliable device, so the hydrometer floating in the battery acid is found to give a safe indication of the condition of the plates. In large plants daily observations are taken of every cell, and recorded on a chart. Water is added to replace that lost by evaporation or decomposition, and acid to replace that lost by spraying. If a cell shows an unexpected diminution in specific gravity, a fault is at once suspected and, if possible, it is located and removed.

Any book published on electrical subjects can be obtained of Telegraph And Telephone Age, 253 Broadway, New York.

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Report of Committee on High Tension Wire Crossings.*

(*Continued from page* 505.)

31. The poles, or towers, shall also be designed to withstand the loads specified in paragraph No. 30, combined with the unbalanced tension of:

2 broken wires for poles, or towers, carrying 5 wires or less.

3 broken wires for poles, or towers, carrying 6 to 10 wires.

4 broken wires for poles, or towers, carrying 11 or more wires.

32. Crossarms shall be designed to withstand the loading specified in paragraph No. 30, combined with the unbalanced tension of one wire broken at the pin farthest from the pole.

33. The poles, or towers, may be permitted a reasonable deflection under the specified loading, provided that such deflection does not reduce the clearances specified in paragraph No. 10 more than 25% or produce stresses in excess of those specified in paragraphs Nos. 65 to 69.

FACTORS OF SAFETY.

34. The ultimate unit stress divided by the allowable unit stress shall not be less than the following:

Wires and cables	2
Pins	2
Insulators, conductor attachments, guys	3
Wooden poles and crossarms	6
Structural steel	3
Reinforced concrete poles and crossarms	4
Foundations	2

NOTE.—The use of treated wooden poles and crossarms is recommended. The treatment of wooden poles and crossarms should be by thorough impregnation with preservatives by either closed or open-tank process. For poles, except in the case of yellow pine, the treatment need not extend higher than a point two feet above the ground line.

35. INSULATORS: Insulators for line voltages of less than 9,000 shall not flash over at four times the normal working voltage, under a precipitation of water of one-fifth of an inch (1-5") per minute, at an inclination of 45 degrees to the axis of the insulator.

36. Each separate part of a built-up insulator, for line voltages over 9,000, shall be subjected to the dry flash-over test of that part for five (5) consecutive minutes.

37. Each assembled and cemented insulator shall be subjected to its dry flash-over test for five (5) consecutive minutes.

The dry flash-over test shall be not less than:

Line Voltage.		Test Voltage.
Exceeding 9,000	but not exceeding 14,000.	65,000
Exceeding 14,000	but not exceeding 27,000.	100,000
Exceeding 27,000	but not exceeding 35,000.	125,000
Exceeding 35,000	but not exceeding 47,000.	150,000
Exceeding 47,000	but not exceeding 60,000.	180,000
Exceeding 60,000		3 times line voltage

38. Each insulator shall further be so designed that, with excessive potential, failure will first occur by flash-over and not by puncture. Each assembled insulator shall be subjected to a wet flash-over test, under a precipitation of water of one-fifth of an inch (1-5") per minute, at an inclination of forty-five degrees (45°) to the axis of the insulator.

The wet flash-over test shall be not less than:

Line Voltage.		Test Voltage.
Exceeding 9,000	but not exceeding 14,000.	40,000
Exceeding 14,000	but not exceeding 27,000.	60,000
Exceeding 27,000	but not exceeding 35,000.	80,000
Exceeding 35,000	but not exceeding 47,000.	100,000
Exceeding 47,000	but not exceeding 60,000.	120,000
Exceeding 60,000		Twice the line voltage

39. Test voltages above 35,000 volts shall be determined by the A. I. E. E. Standard Spark-Gap Method.

40. Test voltages below 35,000 volts shall be determined by transformer ratio.

MATERIAL.

41. CONDUCTORS: The conductors shall be of copper, aluminum, or other non-corrodible material, except that in exceptionally long spans, where the required mechanical strength cannot be obtained with the above materials, galvanized or copper covered steel strand may be used.

42. For voltages not exceeding 750 volts, solid or stranded conductors may be used up to and including 4/0 in size; above 4/0 in size, stranded conductors shall be used. For voltages exceeding 750 volts, and not exceeding 5,000 volts, solid or stranded conductors may be used up to and including 2/0 in size; above 2/0 in size, conductors shall be stranded. For voltages exceeding 5,000 volts, all conductors shall be stranded. Aluminum conductors for all voltages and sizes shall be stranded.

The minimum size of conductors shall be as follows:

No. 6 B. & S. gauge copper for voltages not exceeding 5000 volts.

No. 4 B. & S. gauge copper for voltages exceeding 5000 volts.

No. 1 B. & S. gauge aluminum for all voltages.

43. INSULATORS: Insulators shall be of porcelain for voltages exceeding 5000 volts.

44. Strain insulators for guys shall have an ultimate strength of not less than twice that of the guy in which placed. Strain insulators shall be so constructed that the guy wires holding the insulator in position will interlock in case of the failure of the insulator.

Strain insulators for guys shall not flash over at four times the maximum line voltage under a precipitation of water of one-fifth of an inch (1-5") per minute, at an inclination of forty-five degrees (45°) to the axis of the insulator.

45. PINS: For voltages of 5,000 and over, insulator pins shall be of steel, wrought iron, malleable iron, or other approved metal or alloy, and shall be galvanized, or otherwise protected from corrosion.

46. GUYS: Guys shall be galvanized or copper covered, stranded steel cable, not less than 5-16 inch

*Presented at the Boston Convention of the Association of Railway Telegraph Superintendents, June 26-30.

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in diameter, of galvanized rolled rods of equivalent tensile strength.

47. Guys to the ground shall connect to a galvanized anchor rod, extending at least one foot above the ground level.

48. The detail of the anchorage shall be definitely shown upon the plans.

49. WOODEN POLES: Wooden poles shall be of selected timber, peeled, free from defects which would decrease their strength or durability, not less than seven (7) inches minimum diameter at the top, and meeting the requirements as specified in paragraphs 17, 30, 31 and 34.

50. CONCRETE: All concrete and concrete material shall be in accordance with the requirements of the Report of the Joint Committee on Concrete and Reinforced Concrete.

STRUCTURAL STEEL.

51. Structural steel shall be in accordance with the Manufacturers' Standard Specifications.

52. The design and workmanship shall be strictly in accordance with first-class practice.

53. The form of the frame shall be such that the stresses may be computed with reasonable accuracy, or the strength shall be determined by actual test.

54. The sections used shall permit inspection, cleaning and painting, and shall be free from pockets in which water or dirt can collect.

55. The length of a main compression member shall not exceed 180 times its radius of gyration. The length of a secondary compression member shall not exceed 220 times its least radius of gyration.

56. The minimum thickness of metal in galvanized structures shall be one-quarter inch (¼") for main members and one-eighth inch (⅛") for secondary members. The minimum thickness of painted material shall be one-quarter inch (¼").

PROTECTIVE COATING.

57. All structural steel shall be thoroughly cleaned at the shop and be galvanized, or given one coat of approved paint.

58. PAINTED MATERIAL: All contact surfaces shall be given one (1) coat of paint before assembling.

All painted structural steel shall be given two (2) field coats of an approved paint.

The surface of the metal shall be thoroughly cleaned of all dirt, grease, scale, etc., before painting, and no painting shall be done in freezing or rainy weather.

59. GALVANIZED MATERIAL: Galvanized material shall be in accordance with the Specifications for Galvanizing Iron and Steel. (Appendix.)

Bolt holes in galvanized material shall be made before galvanizing.

FOUNDATIONS.

60. The foundations for steel poles and towers shall be designed to prevent overturning.

The weight of concrete shall be assumed as 140 pounds per cubic foot. In good ground, the weight of "earth" (calculated at 30 degrees from the vertical) shall be assumed as 100 pounds per cubic foot. In swampy ground, special measures shall be taken to prevent uplift or depression.

61. The top of the concrete foundation, or casting, shall be not less than six inches (6") above the surface of the ground, or not less than one foot (1') above extreme high water.

62. When located in swampy ground, wooden crossing and next adjoining poles shall be set in barrels of broken stone or gravel, or in broken stone or timber footings.

63. When located in the sides of banks, or when subject to washouts, foundations shall be given additional depth, or be protected by cribbing or riprap.

64. All foundations and pole settings shall be tamped in six inch (6") layers, while back filling.

WORKING UNIT STRESSES.

Obtained by dividing the ultimate breaking strength by the factors of safety given in paragraph No. 34.

65. STRUCTURAL STEEL:

	Lbs. per sq. in.
Tension (net section)	18,000
Shear	14,000
Compression	18,000-60x

66. RIVETS, PINS:

	Lbs. per sq. in.
Shear	10,000
Bearing	20,000
Bending	20,000

67. BOLTS:

	Lbs. per sq. in.
Shear	8,500
Bearing	17,000
Bending	17,000

68. WIRES AND CABLES:

	Lbs. per sq. in.
Copper, hard drawn, solid, B. & S.—	
Gauge 4/0, 3/0, 2/0	25,000
Gauge 1/0	27,500
Gauge No. 1	28,500
Gauge Nos. 2, 4, 6	30,000
Copper, soft drawn, solid, B. & S.	17,000
Copper, hard drawn, stranded, B. & S.	30,000
Copper, soft drawn, stranded, B. & S.	17,000
Aluminum, hard drawn, stranded, B. & S.—	
Gauge under 4-0	12,000
Gauge 4-0 and over	11,500

69. UNTREATED TIMBER:

	Bending lbs. per sq. in.	Compression.
Eastern White Cedar	600	600 $(1-\frac{L}{60D})$
Chestnut	850	850 "
Washington Cedar	850	850 "
Idaho Cedar	850	850 "
Port Orford Cedar	1150	1150 "
Long Leaf Yellow Pine	1100	1100 "
Short Leaf Yellow Pine	950	950 "
Douglas Fir	1000	1000 "
White Oak	950	950 "
Red Cedar	700	700 "
Bald Cypress (Heartwood)	800	800 "
Redwood	850	850 "
Catalpa	500	500 "
Juniper	550	550 "

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L=Length in inches.
D=Least side, or diameter, in inches.

The specifications are followed by five appendices giving tabulated information relating to wind and ice loads; conductor sags; specification for galvanizing for iron and steel; pole formulas and drawings of typical crossings.

QUESTIONS TO BE ANSWERED.

[We are daily receiving letters of commendation upon our plan of publishing lists of questions covering chapters in Jones' Diagrams. Students of telegraphy throughout the country are finding these questions of great assistance in their attempts to master the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. We will continue to print similar lists of questions until we have covered all of Jones' Diagrams in this way. We will then take up Maver and Davis' "Quadruplex" and other standard works of telegraphy and treat them in the same manner.]

CHAPTER VII.

What are the conditions of operation of the Stearns duplex?

In working the Stearns duplex what is the effect upon the line of alternately connecting and disconnecting the battery?

Would the polar duplex work if the battery were alternately connected and disconnected?

What must be done in order to insure the operation of the polar duplex?

Why is it necessary, in order to obtain a quadruplex, to combine the Stearns and polar duplexes?

How is the polar relay actuated?

How is the neutral relay actuated?

If the polarity of the battery is reversed what is the effect of the reversal upon the neutral relay?

If the battery is increased in strength what is the effect upon the neutral relay?

In a quadruplex how are the poles of the battery reversed with respect to the line?

How is the strength of the battery increased and decreased?

If, when the battery is delivering its full strength to the line, the poles be reversed, what is the effect upon the polar relay?

Give the names of the instruments employed to reverse the battery and increase and decrease the current therefrom?

What is the function of the transmitter?

What is the function of the pole changer?

Does the current from the smaller portion of the distant battery have any effect upon the home neutral relay?

Which of the two relays is the more sensitive in practical operation, the neutral or the polar?

What are the characteristics of the magnets of the neutral relay?

What is the usual resistance of each coil of the polar relay, and what is that of each coil of the neutral relay?

Study Figs. 27 and 28 in order to understand how the transmitter changes the strength of the current on the wire.

What is the name of the combination of apparatus shown in Fig. 29?

When the polarity of the home battery is reversed, what is the effect upon the home instruments?

Why is a condenser inserted in the balancing wire between the rheostats and the relays?

What is the practical effect of the condenser discharge?

On long lines what is necessary to be done in order to retard the condenser discharge?

Why is it necessary to retard condenser discharges on long lines?

When the larger portion of the home battery is disconnected from the line by the operation of the transmitter, how is the internal resistance compensated for?

What is the effect of reversing the home battery of full strength upon the distant neutral relay?

How is the "clipping" of signals obviated?

What are the common designations for the polar and neutral sides of the quadruplex?

How Mr. Carnegie Spends His Time and His Money.

One of our subscribers wants to know how Mr. Andrew Carnegie spends his money and whether he is as good an operator now as he was in the "fifties" when he worked for the Pennsylvania Railroad Company, at Pittsburg. Many persons who are not in the millionaire class have more or less fantastic notions as to what real millionaires do to pass away the time and Mr. Carnegie is naturally the subject of much speculation. A story has gained circulation among operators that when he travels on land he invariably visits the telegraph offices in railroad stations and assists the overworked operator to receive a few train orders, while it is thought by others who would like to have a few of his millions that when Mr. Carnegie is at sea he puts in an occasional trick at the wireless.

It is stated that as he was walking down street one day he was stopped three times in each block by people who wished him to aid them financially. One minister wanted a new bellows for his church organ and he got them by the proper use of his own bellows.

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. Both foreign and provincial messages shared in the increase, which has to be compared with an average daily total of from 150,000 to 200,000.

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Telephone Economy in Railway Service.*

BY G. K. HEYER, OF NEW YORK.

There are few, if any, recent developments in the railway field which in so short a time have created such a widespread interest as that of telephone train dispatching.

The telegraph coming into the railway service as it did in 1850 through the foresight of Superintendent Charles Minot of the Erie Railroad made possible the abolition of the old time interval and flag system of advancing trains and the adoption of the present telegraph dispatching system, which it was thought for many years possessed sufficient advantages to allow the other branches of our railroads to be developed to the greatest possible efficiency. In spite of the improvements obtained by the telegraph, the first engineer who received a telegraph train order refused to run on it, believing that the risk attending such action was altogether too great.

In the search for increased efficiency in the telegraph department, the telephone, thirty-one years after its invention, was turned to as offering the greatest possibilities. The one disadvantage of the telephone was that the requirements for commercial service have been such that there was little or no demand for a means of selectively calling any one station on a long and heavily loaded line. This disadvantage went the way of all others which stand in the way of progress, and there are at the present time several selective devices on the market which to a greater or lesser degree of efficiency answer the requirements. The standard telephone equipment and practice were also found in some features to be inadequate and there have been developed special circuits and apparatus which have greatly improved the service and increased the flexibility and efficiency of the telephone system.

The maximum efficiency of the telephone system has not, however, by any means been reached, and there are under development and study at the present time many improvements, which indicate that there are no requirements for special service within the range of reason which cannot be met.

The advantages in favor of the telephone are that it is more flexible, quicker, safer and more reliable, and in addition makes possible better discipline and co-operation, 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. The first installations made in the Fall of 1907 were so successful that there are to-day in the United States and Canada approximately 48,000 miles of line, or nearly 20 per cent. of the total railroad mileage equipped for telephone train dispatching, and the results obtained in every case sustain the judgment of the early advocates of the telephone.

Upon investigation in these days of scientific management, efficiency methods, etc., there stands out alone, far more important than any of the other advantages mentioned, although dependent in a great measure upon them, that of economy or the saving in dollars and cents which may be obtained by the use of the telephone.

Some of the factors which increase the traffic capacity and therefore make for economy in the telephone method of operation are:

1st. The time of calling stations, sending orders and receiving train reports is so greatly reduced (30 to 50 per cent.) that the time gained is available for the dispatcher in better laying out his work, planning meeting points and handling the endless amount of detail which the position requires.

2nd. Dispatchers are more efficient, due to the fact that they are relieved of the mental and physical strain attending the continual operation of the Morse key, which has a most damaging effect on the nervous system and frequently results in what is known as operator's paralysis.

3rd. Through the use of the portable and siding sets train crews may get into communication with the dispatcher and receive their advance orders directly from him. This has proven a most valuable branch of the service, especially in advancing freight trains which have taken a siding some distance from a station or tower. Also, during the night, when on some roads part of the stations are closed. In this latter case the train conductors may be provided with keys and in that way have access to the dispatching telephone.

4th. The dispatch and exactness with which reports of progress on clearing up wrecks and repairing breakdowns is given to the dispatcher, thus allowing him to determine as to the handling of other trains, routing them over other roads, etc.

It has been estimated by some of the roads that if, from a wreck or any other cause, traffic is held up, the additional expense incident thereto amounts to approximately $1,000 per hour. On the average, with the telephone system, wrecks are cleared up and traffic moving again in one-half to two-thirds of the time that is possible with the telegraph. A considerable saving, therefore, can be effected in these features of railroading, and approximate yearly figures may be arrived at by knowing the cost of suspended traffic and multiplying this together with one-third or one-half of the average time of clearing wrecks and the number of wrecks per year.

It may seem strange to many, particularly those who have not yet installed telephone equipment, to hear that such a saving is possible. Of course, the nature of the equipment is such that the initial cost of telephone apparatus is much higher than that of the telegraph equipment. Further, the cost of maintenance is also considerably greater with the telephone. The saving, therefore, does not show on the books of the telegraph department, and in fact, this department shows a somewhat increased running expense. This increase is, however, insignificant when compared to the reduction in the cost of handling traffic. The traffic or transportation department is then the place to look for the real

*Paper read at the Boston convention of the Association of Railway Telegraph Superintendents, June 26-30. Slightly abridged.

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excuse for the expense of providing the telephone system.

The difficulty and expense incidental to securing from the records kept at the present time information from which may be computed reliable figures of comparative expense has undoubtedly delayed the preparation of such statistics. Mr. W. F. Williams of the Seaboard Air Line has, however, prepared information which shows that for one month on 150 miles of single track on his road, and with a 14.4 per cent. greater density of traffic for 1910 when the telephone was used, an average saving of one hour and twenty-six minutes in the running time of all through freights was effected over the same period for 1908 with the telegraph. This is a saving in time of 10.9 per cent. and it will be seen instantly by computing the pay of the train crews, reduction of overtime charges, increased efficiency of the motive power, the reduction in fuel consumption, the increased speed of hauling perishable freight, etc., that on any road the telephone is a good investment.

It is not possible to give a general figure representing in dollars and cents the value of the time saved, on account of the conditions surrounding the various railway systems. If, however, the items as given are reduced to a monetary value on the individual system, the results obtained will be greatly surprising, and in the case referred to would represent approximately from $1,000 to $1,500 per month, or a yearly saving of at least $12,000. Comparing the cost on the telephone equipment based on $100 per mile, (which includes the cost of telephone and selector apparatus, line wire—No. 9 B. & S. 208 lbs. to the mile—and installation) to the yearly saving in handling through freight traffic alone, it will be seen that the telephone will pay for itself the first year. In other terms, the yearly saving amounts to in the neighborhood of $100 per mile. Carrying this still further, we may say that for the 48,000 miles equipped there should be a difference in operating expense of approximately $4,800,000.

From information received from various sources, it is evident that on all roads hauling any considerable amount of through freight that the time consumed has been reduced since the installation of telephone equipment to compare very favorably with that shown on the Seaboard. For instance, on the Delaware, Lackawanna & Western Railroad, after the completion of the service between Binghampton and Buffalo, a distance of 206 miles, with 46 stations, the through freights were run in approximately two hours less than was the rule when the dispatching was done by telegraph.

With the great increase in the number of telephones for commercial service and the consequent economies effected, it is only to be expected that the use of the telephone for railway service will gradually be extended to embrace many other branches. In fact this has already been done on some of the more progressive roads.

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, 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 a part of the time.

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 weather-proof compartment, can be placed at any point along the line and the telephone and selector connected directly to the train wire.

The Devil in Turkey.—Referring to the concession recently granted to an English syndicate for the installation of a telephone system in Constantinople, the *St. Martin's-Le-Grand*, of London, tells a humorous story in connection with the introduction of the telegraph in that country: "A full meeting of the Ulema debated it," the story goes on, "and declared it to be the invention of the devil. But a wise and ancient Mollah who presided, said, 'My children, the telegraph is a good thing.' 'What,' chorused the others, 'do you mean that it is not a work of the devil?' 'Oh, assuredly,' answered the president, 'assuredly it is a work of his; but why are you so dull of understanding, my children? Can you not see that if the devil is occupied going up and down the wires with each message sent, he will have less time to trouble us mortals on the earth below?' And so Turkey got her telegraph, and has to-day 49,200 miles of these devil's pathways gleaming over the heads of the faithful."

Business in Prospect.—A certain telegraph superintendent recently asked the manager in a small town why his monthly reports were delayed, whereupon the manager replied: "Sent none; received none; prospects good."

Sending Machines Cannot Retaliate.—An operator in a Western city wrote "ananvan" for 1141 and in order to find an excuse for it blamed the sending machine.

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Current Indicator for Morse Relays.

BY J. S. KNAPP, BUFFALO, N. Y.

So much trouble results from the breaking in on a wire during wet weather by inexperienced telegraphers while their relay is out of adjustment, that anything tending to relieve the situation is always welcome. The following simple remedy has been proven thoroughly effective in such cases and is offered for the benefit of the service.

Each relay should be equipped with a small compass, about the size of a ten-cent piece, imbedded in the top of the relay base, directly in front of the center of the armature and as close to the latter as possible without touching it. It is evident that when the line is open or closed, the compass needle will remain practically at rest, but as soon as signals are being made by any office on the line, it will turn upon its pivot with a quickness of motion depending upon the electromagnetic force exerted upon it.

After once being instructed, operators will naturally observe the tell-tale compass and the old wet weather bug-bear will be a thing of the past.

The Telephone Relay.

Numerous tests have been made in recent years in telephone practice, says *Zeit. f. Schwachstromtechnik,* to strengthen the sound transmitted by the wires. In spite of numerous patents and trials it has not been found possible to fulfill all conditions necessary in practical work for the desired ends. The two reasons which account for the failure in this direction are probably, first, that the fundamental tones of the relays were chosen too low, and, second, that the relays were not sensitive enough. Even the receivers, as also the microphone diaphragms, are deeper in tone than they really should be for best results. If the two parts of the apparatus are joined together in practice, the fundamentals are lowered still more, and the relay therefore strengthens the low tones, but weakens the higher ones, which are the ones that are absolutely necessary to the transmission of sound. Consequently the sound transmitted is in poor condition and unintelligible.

Another circumstance which impeded the exploitation of the telephone relay was the fact that it was only to be used to strengthen weak currents, and therefore it was only brought into the line at the ends of the electric current circuits. In long overhead lines, as, for example, in 1,000-km. lines, the stray currents are almost as strong as the telephone currents, and it can even happen that the stray currents have a higher tension than the telephone currents. As the frequency of these currents will always be lower than the telephone circuit frequency, the result is that the stronger currents are strengthened still more, resulting in a poor transmission of sound. To be successful the telephone relay must be placed in the circuit where the telephone currents are far superior to stray currents, which is done in most cases in present practice on long distance lines. It is probably impossible to construct a telephone relay which will meet all the requirements of the present type of microphones. However, it is possible with high tension microphones, even without relay, to speak over lines of several thousand kilometers length. If a telephone relay is placed in the circuit after the first 1,000 km., the effect can be improved considerably.

If, for example, the vowel "a" is spoken into the microphone, using a 1,300-km. line of 4 mm. bronze wire, and the relay is placed after the first 900 km., the receiving current at the end of the line will be 1,928 microamperes, where it would be only 212 microamperes without the relay.

If the same vowel is spoken into a microphone on a 1,700-km. line, and the relay placed again 900 km. from the transmitting microphone, the receiving current will be 848 microamperes, where it would have been 212 microamperes without the relay.

If under the same conditions the distance is 2,100 km. and the relay at 900 km. from the transmitter, the end current without the relay will be 50, with the relay 318 microamperes.

On a 2100-km. line under similar circumstances, the end current will be 318 microamperes, and when the relay is placed at a distance of 900 km. from the transmitting microphone it will be 7,845 microamperes. Just before the current reaches the relay it will be 1,060 microamperes. If the same vowel is spoken into the microphone of a 2,100-km. line, and a shunt is used, the relay will send a current of 7,000 microamperes into the line. The current just before the relay is 848 microamperes. The current at the beginning of the line is 1,225 microamperes.

Thousands of kilometres can be gained by a single relay placed at the right position in the circuit. In connection with these investigations microphones were used that could be cooled and had a construction similar to that of the ordinary long distance telephone microphones. A receiving apparatus with a lever resistance was also tried, and, of course, in this case the end current is larger. Further tests, in which the relation of the current received in the transmitter and that sent by the relay into the line was investigated, have shown that with a certain number of sound waves resonance sets in, which is also the case in microphone diaphragm. The best plan was thought to be the one of placing several relays in a telephone circuit, where one relay is calibrated to the number of vibrations most necessary to telephone conversation, namely, the vowel "a," of 900 periods, and then another relay which is tuned to a much higher number of vibrations. This did not work out in practice as anticipated, and no satisfactory results have been found out so far to meet this condition. There is no doubt, though, that a suitable relay which will meet all requirements will be constructed within a short time.

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Telegraph Construction on the Canadian-Pacific Railway.*

BY E. A. LAKEY.

I had the good fortune to be sent out to Calgary (Alberta) in connection with the opening of the Pacific Cable Board's land line from Montreal to Vancouver. Calgary is 2,252 miles from Montreal on the Canadian-Pacific Railway, and naturally the Canadian-Pacific Railway telegraph construction came under my observation.

The line of poles is located, wherever possible, at least 30 ft. from the rail, and the poles are erected from forty to forty-four poles to the mile. Two kinds of cedar poles are used, but they are not "preserved" in any way. In the Eastern provinces the swamp cedar is utilized. These poles are rather short and crooked, and have an average life of about twenty-five years. In the West the poles are of mountain cedar. These are long and straight, and good poles can be obtained up to 120 ft. or so in length. The mountain cedar pole, however, does not last so well and has a life of about ten years on the sandy soil of the prairie. A peculiarity of their decay on the prairie is that the rot takes place from the butt of the pole upwards, and not at the ground line, owing to the action of the alkali in the ground.

Cross-arms are of fir. An arm for four wires, or a 4-pin arm, as it is termed in Canada, is 6 ft. long, and the 6-pin arm is 7½ ft. The top of the arms is 4 in. below the bottom of the roof of the pole, and they are fixed on the pole 2 ft. between centres, being fastened by two 6½ in. coach-screws. All 4-pin arms are braced with one iron brace, 28 in. x 1 in. x ¼ in., placed at an angle of 45°. The 6-pin arms have two braces, one on each side of the pole, and one coach-screw is used to fasten both braces to the pole. Braces are attached on the face of the pole and the face of the arm. Insulator pins are of oak and 9 in. long. The portion in the arm is 4 in. long and it is fastened by a nail.

The insulators are mostly glass, and they are of all shades of blue and green. I noticed some porcelain insulators. All cross-arms are fully equipped with pins when put up.

The top of a pole is made wedge-shaped, but no galvanized iron roof is fixed. Four inches of the pole are used for this purpose, so that the top of the first arm is eight inches from the apex of the pole. One or more extra slots or "gains" are cut on each pole in all new work, and where a side block or bracket line is built a flat surface is blazed on the pole at right angles to the gain, the bracket then being fastened to the pole with its top nail exactly opposite the top line of the gain. This allows an arm to be added without interfering with the bracket or the wire on it.

It is the practice to double-arm poles at each half mile to save the wires from running back in case of a breakdown. Double arms are also fixed on corner-poles and on the poles adjacent. It is also specified that the first pole from a corner must not be set to exceed 100 ft. from the corner-pole, and as much closer as necessity may require; which in all cases is to be determined by the weight of the line, and the side strain of the corner-pole.

Corner-poles are also to be located so that the wires will not turn at an angle of less than 157½°.

Poles are set up in such a way that the arms on the second pole on each side of a corner-pole are facing the corner-pole. In all other places poles are set up so that the arms are facing alternately. Stays are used in preference to struts, and longitudinal stays are fixed on every fifteenth pole in a long, straight line.

At most of the curves the poles are set with a very decided slant against the curve, but this was well graduated. The heights of the poles are also well graduated in uneven ground and at railway crossings. A clearance of about 12 ft. is given on high ground, and about 30 ft. is given at railway crossings.

Only every fifteenth pole is supposed to be earth wired by means of Nos. 8 or 9 galvanized iron wire for protective purposes. The earth wire extends from 3 in. above the top of the pole to within 1 ft. of the butt, where four spiral turns are made round the pole, and it is then continued to the bottom, where a coil of about 4 ft. is fastened. All terminal poles are equipped in this way.

Holes are generally dug round and 6 in. or so more in diameter than the pole to be erected. The tool in general use for this purpose is a digging bar of octagonal steel 1⅛ in. by 9 ft. Shovels and spoons for removing the soil have handles 9 ft. long. The butt of a pole is well keyed with stones, and great care is exercised in punning. Stones are heaped around the poles fixed on the prairie to prevent grass from growing, so that a prairie fire just sweeps past without damaging the line.

For erecting poles in quicksand a special caisson is used. This is made of ⅛ in. sheet iron, 3 ft. 6 in. long, and having a diameter of 1 ft. 6 in. It is hinged on one side with a bolt on the other side so that the caisson can be withdrawn when the pole is in position.

Mostly galvanized iron wire has been strung, but some of the latest wires are 210 lb. copper, and there is between Montreal and Vancouver, a distance of 2,898 miles, one of 300-lb. copper.

Iron wire is bound in by means of No. 8 galvanized iron wire 14 in. long This is placed around the insulator and each end is given four turns around the line wire. Copper wire is bound with a soft copper binder of the same gauge as the wire being strung. The binder is placed in the groove of the insulator and crossed on the line side. The line wire is then placed over this cross and the binding completed by giving four or more complete spiral turns using up each end

* Post Office Electrical Engineers' Journal.

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of the binder. Sleeves are in general use for jointing copper wire.

Wires are bound in on the side of the insulators nearest the pole except at curves where it may be necessary to place the wire on the opposite side, so that the strain is against the insulator. The general practice for leading-in is by overhead cable from a pole test-box.

To reduce inductive disturbance the Pacific Cable Board's line is transposed every half mile between three poles. Three different methods of doing this are used:

(1) The wire was strung on the outer position of the third arm, and in transposing was raised to an additional insulator fixed on the second arm of the centre pole.

(2) A J-bolt was fixed under the second arm of the centre pole to carry the wire and insulator.

(3) The wire was strung on brackets, and at the centre pole took the outer position on the third arm.

After this brief resumé I will just mention the result of an insulation test I took from Calgary to Fort William on this line, a distance of 1,257 miles. On a differential galvanometer, the only means of testing available, and with 200 volts, there was absolutely no loss discernible. This test was taken in fine weather.

Outing of New York Staff of Commercial Cable Company.

Mr. Clarence H. Mackay tendered an outing to the members of the New York Staff of the Commercial Cable Company, on Sunday, July 23, at Witzel's Point View Island, L. I., N. Y. About 150 members of the staff left the Battery landing by the steamer *"Osprey"* and arrived at the grove at about 11.45 a. m. Breakfast was then partaken of and at the conclusion a baseball game was played between teams representing the Executive Office and 20 Broad Street office, respectively, which resulted in an easy victory for the Executive Office, the score being 15 to 3. Mr. Quinn, the pitcher for the Executive Office, pitched a masterful ball, and Broad Street was only able to get one hit off his delivery. A series of athletic events were then run off, consisting of a wheelbarrow race, a sack race, three-legged race, fat men's race, shoe race, and a relay race between the Executive Office and 20 Broad Street. The last event was the most exciting feature of the day, Broad Street finally winning the race by less than a foot. Very handsome and valuable prizes were awarded to the winners and second men in each of the events, and to each player on the winning ball team and to each runner on the winning relay team. A course dinner was served at 6.30 p. m. and a cablegram from Mr. Mackay, who is now on a tour of inspection of the European stations, was read, and was received with great enthusiasm. Upon the conclusion of the dinner the party boarded the steamer and returned to New York after an enjoyable day.

New Telegraph and Telephone Building in Buffalo.

In two or three months the New York Telephone Company will start the erection in Buffalo of a new building to be located at the southeast corner of Church and Franklin streets, which will be jointly occupied by that company and the Western Union Telegraph Company. The plans will provide for an ultimate "U" shaped building of fifteen stories, with a frontage of 184 feet on Franklin Street and 76 feet on Church Street. The building to be erected at present will be carried up fifteen stories on the corner and four stories in the rear. Additional space will be provided in the future by carrying up the rear of the building to the full height of fifteen stories.

The building will be of the steel skeleton type, fireproof construction throughout, and light glazed brick, terra cotta trim and granite base will be used for the exterior construction. The building when completed will cost approximately $700,000.

The local commercial and supply departments of the New York Telephone Company will occupy part of the first floor, the remainder being occupied by the Western Union, who will also take the entire second floor.

A switchboard with an ultimate capacity of 10,000 lines and an initial equipment of about 5,600 lines will be installed on the fourth floor. When the first switchboard reaches its capacity a second 10,000 line board will be installed on the sixth floor.

On the fifth floor will be located the terminal room, occupying with a men's room, the entire floor at present. The racks to which the underground and telephone switchboard cables are connected, the arresters which protect the telephone lines from lightning and stray currents, the power plant and storage batteries and all the other frames and racks necessary in connection with a modern telephone exchange, are located in this room.

The sixth, seventh and eleventh floors will not be occupied at present by the New York Telephone Company or allied companies and will probably be divided into offices and rented as such. The eighth floor will be occupied by the American Telephone & Telegraph Company, the ninth and tenth floors by the division auditor and force, the twelfth by the plant engineer, the thirteenth by the division plant department, the fourteenth by the traffic department and the fifteenth by the division commercial department.

English Telegraph System.—The London main telegraph office is stated to be the largest in the world. From it underground telegraph cables are laid to Scotland on the north and to the southernmost point of England, with similar underground trunks east and west. The post-office has now nearly 1,200,000 miles of wire, half for telephone, and nearly 750,000 miles of that aggregate is underground or submarine cables, proof against snow, sleet and wind.

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Selectively Operated Semaphore and Telephone Equipment.

Since the development of the telephone for train dispatching, a need has been felt for signaling equipment which could be used and operated in connection with a telephone train wire. That is, instead of having a selector on a telephone circuit ring a bell at a way station, it was required that it should throw a semaphore arm. The Western Electric Company, in conjunction with the Union Switch and Signal Company, has developed apparatus to meet this particular need.

Both steam and electric railroads offer an extensive field of use for this selectively operated semaphore in connection with the telephone system. On steam roads it will probably be used exclusively for train order work. In other words, it will be employed as an auxiliary to a regular telephone train dispatching system. When used in this way it will secure a still further saving than is now effected by the telephone.

FIG. 1.—SELECTIVELY OPERATED SEMAPHORE.

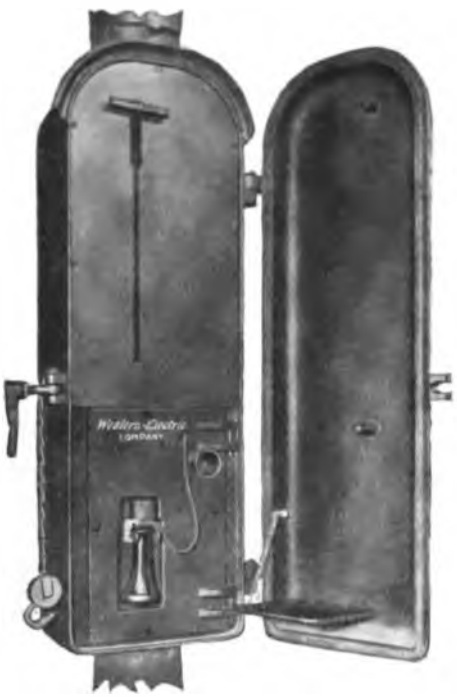

FIG. 2.—CASTING CONTAINING SIGNAL MECHANISM.

FIG. 3.—SELECTOR AND TERMINAL APPARATUS INSIDE OF CASTING.

The train order semaphore can be installed at any point desired along the right-of-way: the dispatcher can throw it at will just as he can call a way station. He is informed absolutely as to whether the selector which he threw operated, and when the train is stopped by this means he can get into direct touch with the train crew and give them their orders.

The semaphore can, in many places, be used as an auxiliary to the regular dispatching system, as it can be located at sidings or at points where the expense of a station and operators is not warranted. It thus forms a safeguard to the system that does not include the human factor. It can also, of course, be used in conjunction with way stations for this same purpose, permitting the dispatcher to throw a signal to "stop" if he, for any reason, cannot reach the operator he desires.

Sometimes when trains are cleared it is desired to stop them further on, such as at the entrance to a yard or at other points before they reach their next train order station. In all such cases the selectively operated semaphore forms a valuable adjunct to the train dispatching system.

In Fig. 1 is shown the outfit complete. The semaphore proper is of standard make and can be furnished in either the upper or lower quadrant types, as desired. A three-spectacle casting is provided. The semaphore, selector and telephone equipment are all mounted on the same iron post, and the apparatus is self-contained. All the telephone apparatus is water-proofed to withstand moisture. All wood used in the interior of the set is oil treated. The telephone and selector are enclosed in an inner compartment. All openings are arranged so that water cannot enter the set. In addition, the outer door of the set has a weatherproof gasket, rendering it practically impervious to moisture.

Fig. 2 shows the pole casting containing signal mechanism, the telephone and selector equipment. The signal mechanism is of the electrically operated type, but is manually restored. The relay operating this is normally de-energized, and ten dry cells are required for its operation. As

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this relay will operate on four cells, it is obvious that an ample margin of operation is allowed. One important feature of the selectively operated semaphore is the fact that it gives to the dispatcher an answer-back which cannot be mistaken, telling him that one particular semaphore has completed its movement and is at the "Stop" position at the time the answer-back signal is received.

The telephone set is especially designed for railway work. The transmitter and receiver are mounted on the outside of the inner door, on the lower part of the apparatus casting. The signal mechanism is operated by the Western Electric's latest railway selectors.

Fig. 3 shows the arrangement of the selector and terminal apparatus on the inside of the casting.

The circuit arrangements of the signaling equipment are very similar to the company's standard train dispatching circuit. The dispatcher operates selector keys in the same manner; instead, however, of a bell ringing at the point called, a semaphore blade moves to "Stop." The answer-back signal returns to the dispatcher clearly and distinctly and then it waits for the crew of the train so signaled to call in.

Sandwich Electric Company.—At the recent Boston convention of the Association of Railway Telegraph Superintendents, the Sandwich Electric Company, of Sandwich, Ill., made an exhibit of its type 9 B selector, and No. 76 call-box such as is used in dispatcher's circuits and intercommunicating message circuits. One of the specialties shown was the cordless jack box. Another feature of the exhibit was the block office set, assembled in a compact form for use on a metallic block circuit, the two wires of which are automatically simplexed and can be used for a Morse message circuit, at the same time they are used for the telephone block. The exhibit was in charge of Mr. C. S. Rhoads, Jr., engineer of the company.

Extension of Telephone Train Dispatching on the Lehigh Valley Railroad.

The Lehigh Valley Railroad has just placed an order with the Western Electric Company for selector and telephone apparatus to equip the west end of the Buffalo division. The new circuit will be 135 miles in length and the dispatcher will be located at Buffalo. Upon the completion of the telephone circuits now under construction, traffic on the entire line from Jersey City to Buffalo and Suspension Bridge will be handled by the telephone.

Selective Signaling System.—The General Railway Signal Company, Rochester, N. Y., has issued a bulletin, No. 114-A, describing and illustrating its selective signaling system as used in telephone train dispatching. It is a neatly designed and executed pamphlet and the subject is presented in an attractive manner.

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.]

(53) Q. What is the usual cause of the failure of a selective calling instrument to operate? I. O.

A. It is generally due to either a weak main battery or a weak local battery. All batteries should be inspected and tested at regular intervals. Repeated false calls are indications of weak main battery or improper signal relay adjustment.

(54) Q. In measuring the voltage of dry cells is it advisable to take the measurement with the current flowing? What is the lowest permissible voltage of a cell? V. M.

A. Yes. When cells tested under load show less than 0.7 volt they should be renewed.

(55) Q. What is the required insulation of condensers used in duplex and quadruplex telegraphy? C. A. I.

A. About 40 megohms per microfarad after a charge of one minute duration.

(56) Q. How much current is necessary for the proper operation of a 150-ohm relay, and how much for the polar and neutral relays of a quadruplex? R.

A. About forty milliamperes for a Morse 150-ohm relay; about twenty-five milliamperes for a polar relay and about seventy milliamperes for the neutral relay.

(57) Q. What book can you recommend as covering the entire subject of telegraphy in theory and practice? C. Y. R.

A. Maver's "American Telegraphy and Encyclopedia of the Telegraph," is the standard work on telegraphy in this country. The price is $5.00 per copy. Copies can be obtained at the office of TELEGRAPH AND TELEPHONE AGE.

(58) Q. Please give me some information regarding German silver wire; what are its constituents, unit weight, specific gravity, etc. T. T.

A. German silver is an alloy consisting of 18 per cent. to 30 per cent. nickel and the remainder about 4 parts copper to 1 part zinc. The weight of the alloy per cubic foot is about 530 lb.; specific gravity, 8.5. The resistance of the 18 per cent. alloy at 25° C. is 18 times that of copper, and of the 30 per cent. alloy about 28 times that of copper. The maximum safe carrying capacity of German-silver wire in spirals in open air for continuous duty is such that the circular mils per ampere vary from about 1,500 in No. 10 wire to about 475 in No. 30. For intermittent duty, the capacity is twice as great.

(59) Q. What kind of wire is generally used for telephone train dispatching and message circuits? F. C. M.

A. Hard drawn copper No. 9 B. & S. gauge, weight 209 lbs. per mile and with a resistance of 4.186 ohms per mile.

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Listening Set and Foot Switch for Telephone Train Dispatching Circuits.

A sole leather listening outfit for telephone train dispatching circuits has been put upon the market by the Western Electric Company. This device is so small that it can be very easily carried in the pocket. It consists of a receiver, condenser and the necessary cords and clips for attaching it to the line. With this instrument, which is illustrated in Fig. 1, it is possible for an official to

FIG. 1.—LISTENING SET.

connect the receiver to the line at any station where he may happen to be, without interfering with the regular operator and without anyone knowing that he has cut in on the circuit.

Fig. 2 shows a foot switch which has been designed by the same company for use on telephone train dispatching circuits having any number of telephone sets up to 60 or 70. For conditions like this where it is possible for any number of these

FIG. 2.—FOOT SWITCH.

stations to be listening in upon the circuit simultaneously and where quite frequently from four to six stations are called in to receive orders, this apparatus has been especially designed. The switch consists merely of a cast iron case in which the switch springs are mounted and from which a lever projects to operate the springs by foot power. It permits of greater speed in the use of telephone apparatus. For this reason it is largely used in connection with the special types of telephone arms with which an operator does not have to put on any head set nor touch a receiver. These arms were especially designed for use in interlocking towers where the operator is obliged to get away from the telephone quickly in order to handle the switch levers.

New Telephone Circuits for Chicago and Northwestern.

The Chicago and Northwestern Railroad Company which has been using the telephone for dispatching trains on several of its divisions for some time past, has just placed an order with the Western Electric Company for telephone selectors to equip five new circuits. The number of selectors used on these circuits will be 130 and the length of circuits will be over six hundred miles.

The circuits to be equipped are on the Fremont division, two on the East Iowa division and two on the Dakota division. The Fremont circuit will be equipped with 21 stations, and will run between Fremont, Missouri Valley, Omaha and South Omaha. The East Iowa division is divided into two circuits, the dispatcher for each being located at Belle Plain, Iowa. One circuit extends from Belle Plain to South Clinton, a distance of 116 miles, and is equipped with 31 selectors; the other extends from Belle Plain to Boone, Iowa, a distance of 87 miles, and is equipped with 23 selectors. One of the Dakota circuits will run from Huron to Brookins, with branch lines from Athol to Oakes and from Turton to Croton, the distance covered by this main circuit and branches being 170 miles. The dispatcher will be located at Huron, and the circuit will be equipped with 36 stations. The second Dakota circuit will run from Huron to Tracy, a distance of 163 miles. This circuit will be equipped with 20 stations and the dispatcher will be located at Huron.

Telephone Apparatus.—The Kellogg Switchboard and Supply Company, Chicago, Ill., has issued a very complete bulletin of the apparatus manufactured by it. It is a new and unique catalogue and covers all the important items in standard telephone work. Each item is illustrated, coded and briefly described. A telephone man wishing to buy anything from binding posts to pole changers, or dry cells to a twenty-thousand line exchange can find the important specifications in this catalogue in a moment's notice by referring to the comprehensive index.

Suggested Rules for Telephone Train Dispatching.—In Bulletin No. 502 issued by the United States Electric Company, New York, are given suggested rules for telephone train dispatching. This subject was made the basis of an interesting article in our issue for June 16, by Mr. J. W. Barney. These rules are indicative of approved practice, but are not mandatory in any sense of the word.

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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. The company chartered a steamer upon which the employes were taken on a trip up the Sound and along the Connecticut shore as far as Stamford, returning to College Point, where the rest of the day was spent. During the afternoon various sports were indulged in and a game of baseball between a team composed of operators and clerks and one made up from the messenger staff was won by the clerks with a score of 17 to 5. After the ball game various foot races were run, and at 6 p. m. an excellent dinner was served.

Mr. E. C. Sweeney, traffic manager, New York, was honorary president of the day, and among the other guests were: Messrs. G. Godfroy, C. Sutton, C. Striffling, D. Callaghan, J. Wiseman, J. Coghlan, G. Jenkins, M. Porter, J. Kernan, B. Jordan, J. G. Sherry, and K. Lutz.

T. M. B. A. Assessment.—Assessment No. 527 has been levied by the Telegraphers Mutual Benefit Association to meet claims arising from the deaths of Thomas P. Scully at Brooklyn, N. Y.; Emily C. Ormsby at Canandaigua, N. Y.; Robert S. Haynie at Kansas City, Mo.; Jesse H. Robinson at Washington, D. C.; Frank J. Brown at Detroit, Mich.; George Heitz at Vincennes, Ind.; Teresa J. Bunnell at New York, N. Y.; Cyrus Cole at Jersey City, N. J.; William F. Burton at Nashville, Tenn.; Samuel J. Dennis at Arlington, N. J.; De Witt Bander at Hammondsport, N. Y.; George F. Lehmer at Omaha, Neb.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, POSTAL.

Harry Medway and John J. McLaughlin, of the clerical department, died recently. Both men were in the prime of life and had many friends in this office.

Chief Operator E. W. Miller has returned to his desk after a stay in the country, looking very much refreshed.

Mr. Morris Ruberg, of the American Telephone and Telegraph Company, was a recent visitor.

PHILADELPHIA, WESTERN UNION.

Mr. Frank E. Maize, manager of the Electric Bureau, is spending a two weeks' vacation at Wildwood, N. J.

Miss Fannie Schott has returned from a ten days' vacation spent at Wildwood, N. J.

Miss Nannie Hall is spending a vacation at the Delaware Water Gap, Pa.

SAN FRANCISCO, WESTERN UNION.

Mr. A. C. Parsons, formerly night chief at San Francisco, has been transferred to Los Angeles as chief operator vice Mr. S. J. Gray, who is now at Vancouver, engaged in special work for the company.

The main operating room is being fitted up with new tables and new equipment, filling in the space formerly occupied by the old switch board and dynamos. The board has been moved to the new quad. room on the third floor. The staff in the quad. room consists of Messrs. W. H. Wilson, T. Crow, S. Mills, T. Gilbert, J. L. Lowrey, C. H. Warrensford and T. H. Hooper.

The great telegraphic song hit, "SEND ME A NIGHT LETTER, DEARIE." Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.

B. L. BRANNAN,
195 B'way, N. Y.

FOR SALE—A Bunnell galvanometer, complete in leather case, with resistance coils and connections for Wheatstone bridge measurements. Must be disposed of immediately to close an estate. Cost over $100.00. Will sell for $35.00. Address "Galvanometer," care Telegraph and Telephone Age, New York.

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 $327,000, 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.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 16. NEW YORK, AUGUST 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Electrical Wire Connections for Automobile Gasolene Motors.

A correspondent writes as follows:

"Now that quite a number of operators and others in the telegraph service have risen to the dignity of owning an automobile, will you kindly give us some information concerning the manner in which the battery and electrical connections for gasolene motors are made and the principle of operation? If to this you can add any other information or advice that may be useful, I think you will find many eager readers."

While the writer of this column does not claim to be an expert on the automobile and its operation, he will endeavor to reply to the inquiry by imparting such information as he personally gained while cutting a large wisdom tooth during his first season's experiment with a touring car.

We will begin with the "other information" requested.

Probably the best advice the writer can offer to a novice who contemplates the purchase and personal operation of a car is that unless he possesses a pretty substantial reserve bank account, is "DON'T." At least he should postpone the personal operation of the machine until he has studied the proposition carefully and thoroughly understands its construction, as well as learned the pitfalls to avoid.

The fact has been pretty well established that the ignorance of certain necessary preliminary facts usually costs the majority of novices between $100 and $200 the first season, nearly all of which expense might have been avoided had they learned the ropes before instead of "after taking."

For the inexperienced it makes but little difference whether the car is new or second-hand; the result will be practically the same. His expense account is usually due to ignorance of the following facts:

LOOSE BOLTS AND NUTS.

The vibrations caused by the motion of the car soon loosens the nuts and bolts. When this occurs, even though one may escape an accident, the thread and other parts not only wear down quickly and require renewal, but such defects often first throw other parts of the machinery out of gear and cause serious trouble. Thus a loose nut may cause a fore wheel to be put out of alignment with the rear wheels. When this happens, the result is disastrous to the tires.

TIRE TROUBLE.

When a wheel wabbles or is out of alignment the tire is dragged over the ground for several inches during each revolution just as if it were locked for the time being. The result is that the rubber is soon either split open all around the periphery or worn down to the canvas. The weakened shoe is then unable to protect the inner tube properly and a "blow-out" soon follows. Other blow-outs obviously follow in quick order, after which both shoe and tube become unsafe and practically useless.

MISTAKEN ECONOMY.

When a novice is first confronted with the necessity of purchasing new tires he usually makes the mistake of buying a "second" or an inferior grade on account of its somewhat lower price. They all look alike to him.

The lesson he learns by pursuing this course is that the cheaper grades possess neither the quantity of rubber nor the strength to withstand a grind or temporary strain long enough for him to locate the trouble and remedy it. A first class shoe, however, gives ample time for investigation without being appreciably affected. It costs, probably, 15 or 20 per cent. more than the inferior kind, but will last three times as long. By the time two or three cheap tires have been worn out and as many inner tubes have been ruined he has learned that one high grade shoe costs much less in the end and gives better service in every way.

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LUBRICATING OIL.

The same rule applies to the quality and quantity of lubricating oil used. The better the grade and more of it used, within reasonable limits, the less expense one will incur. Oil, of course, is expensive, but it is very cheap indeed compared with the cost of renewing worn out and broken parts of machinery due to the lack of it. Once let the oil tank run dry, or, if the oil does not drop properly, the engine soon becomes hot, the piston expands and a broken cylinder is the consequence.

In like manner if the water tank becomes empty and the cylinder is not properly cooled, the latter is again endangered. In cold weather should you forget to empty the tank after a trip and the water should freeze, a bursted cylinder, again, is almost certain to result.

It may be readily seen that a needless expense of a hundred or more dollars incurred while cutting one's wisdom teeth, is not only possible, but more than probable.

Finally, it is not wise to buy a second hand car until the machinery has been laid bare and every separate bolt and part seen and examined. It is the renewal of worn parts that adds to the purchase price and one should know just what he is getting before agreeing to pay any fixed sum.

THE ELECTRICAL PART.

The electrical part is much simpler than one would expect to find, yet the battery and connections must be just right or the engine will balk. The gas engine operates through the explosion of gas in the heads of the cylinders and each explosion forces the pistons outward. The explosions are caused by an electric spark from an induction coil and occur within the cylinders where the spark plug "points" are concealed.

The accompanying diagram shows the general method of wiring. There are, of course, different

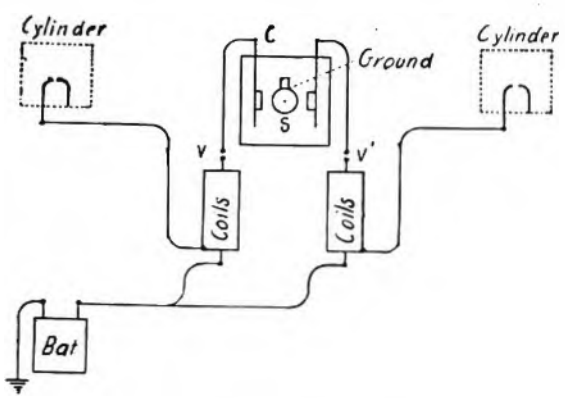

FIG. 1.—WIRING DIAGRAM.

ways of making the connections, but the principle involved is the same for all machines using battery and induction coils.

It will be seen that there are no "return" wires to the battery. By connecting the negative pole of the battery to the metallic body of the frame of the car and grounding the terminals of the various circuits leading from the positive pole in like manner, as illustrated, the frame acts in the capacity of a return wire and we have practically a metallic circuit.

C is what is called a commutator, but is in reality merely two metal springs which form the terminals of the two primary windings of the spark coils. *S* is a revolving shaft with a cam or projection on it which makes contact with each of the primary terminal springs during one revolution, and being "ground-

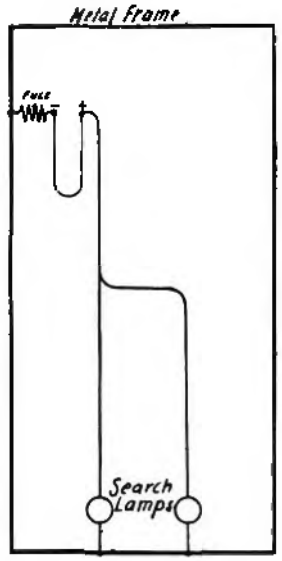

FIG. 2.—LAMP CONNECTIONS.

ed" completes the circuit. During contact with spring *V* or *V'*, as the case may be, it breaks the circuit and causes the secondary coil to discharge, thus creating a spark in the cylinder spark plug. As contact with the companion terminal is just half a revolution distant the gas in each cylinder is exploded and discharged separately while the other cylinder is refilling. Fig. 2 shows how the connections may be made for utilizing 6-volt electric lamps instead of an acetylene gas generator. The one battery will suffice for both lamp and spark and makes a dazzling headlight.

Recent Telegraph and Telephone Patents.

ISSUED JULY 18.

997,990. Electromechanical Selector. To E. G. Godfree, Hampton near Melbourne, Victoria, Australia.

998,040. Telephone System. To H. O. Rugh, Sandwich, Ill.

998,043. Telephone System. To R. C. Smith, Homer, Mich.

998,161. Magnetic Telephone. To William W. Dean, Elyria, Ohio.

998,552. Electromagnet. To H. O. Rugh, Sandwich, Ill.

998,567. Signaling by Electromagnetic Waves. To R. A. Fessenden, Washington, D. C.

ISSUED JULY 25.

998,705. Telephone Exchange System. To R. H. Manson, Elyria, Ohio.

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998,719. Telephone System. To C. A. Simpson, Chicago, Ill.

999,019. Cooling Device for Telephone Transmitters. To C. E. Egner, Stockholm, and J. G. Holmström, Saltsjö-Storängen, Sweden.

The Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, has returned from his vacation.

Mr. C. P. Bruch, third vice-president, is absent on a vacation.

Mr. H. A. Tuttle, president and general manager of the North American Telegraph Company, Minneapolis, Minn., was a recent executive office visitor.

Mr. W. D. Francis, superintendent of supplies, who has been seriously ill for some weeks is slightly improved.

Mr. F. B. Travis, manager of the Washington office of this company for the past four and a half years, has been advanced to the managership of the Boston office. Prior to his appointment to the Washington position, Mr. Travis was for fifteen years chief operator at Boston and is therefore well qualified to assume the important duties of his new position. He was tendered a farewell dinner and reception by the heads of the various departments of the office at Washington on the eve of his departure, and was presented with a purse of gold.

Mr. G. M. Foote, assistant manager of the Washington office of this company has been appointed manager to succeed Mr. F. B. Travis. Mr. Foote has been connected with the Washington office for the past four years in various capacities and is familiar with every detail of the business.

Mr. O. M. Grier has been appointed manager of the Macon, Ga., office to succeed Mr. O. T. Moore, who has been transferred to the managership at Raleigh, N. C.

Mr. Henry Morlan has been appointed manager of this company's office at Salt Lake City, Utah, vice Mr. C. B. Turpin resigned.

The Postal Telegraph-Cable Company has adopted the use of five dashes to signal a cipher in automatic work. This signal is the cipher of the Continental code.

Mr. J. B. Havice, who was recently appointed assistant chief operator of the Postal Telegraph-Cable Company, New York, was born at Leetonia, Ohio, December 22, 1871. In 1885 he entered the telegraph service as check boy for the Western Union Telegraph Company at Columbus, Ohio, afterwards becoming an operator. In 1889 he was appointed manager of the Western Union office at Clintonville, Pa., and between 1890 and 1897 he worked as operator at various places for both the Western Union and Postal companies. Since the latter year he has been with the Postal Company almost continuously, receiving his appointment as assistant chief operator in June of this year.

Limits of Western and Southern Districts of Postal Company.

The district limits and superintendents of the Western and Southern Divisions of the Postal Telegraph-Cable Company are given in *The Postal Telegraph* as follows:

WESTERN DIVISION.

First district, H. G. McGill, superintendent, Chicago, comprises the lines and offices in what is known as Greater Chicago.

Second district, E. W. Collins, superintendent, Cleveland, Ohio, comprises the lines and offices in Ohio (except Toledo) and West Virginia, as at present.

Third district, J. F. Looney, superintendent, Chicago, Ill., comprises the lines and offices in Illinois and Missouri, except Chicago, Kansas City and St. Joseph.

Fourth district, A. L. Lafferty, superintendent, Chicago, comprises the lines and offices in Southern Michigan and Toledo, Ohio.

Fifth district, A. B. Richards, superintendent, Kansas City, Mo., comprises the lines and offices in the states of Kansas, Nebraska and South Dakota, and also offices in Kansas City and St. Joseph, Mo., and Council Bluffs, and Sioux City, Iowa.

Sixth district, W. P. S. Hawk, superintendent, Chicago, comprises the lines and offices in the state of Indiana.

Seventh district, W. C. Black, superintendent, Denver, comprises the lines and offices in the states of Colorado, Wyoming, New Mexico and Eastern Arizona; also Ogden and Salt Lake City, Utah, and El Paso, Texas.

Eighth district, C. A. Comstock, superintendent, Chicago, comprises the lines and offices in Wisconsin, Northern Michigan, Iowa (except Council Bluffs and Sioux City), and Minnesota.

SOUTHERN DIVISION.

First district, C. H. Ashburn, superintendent, Atlanta, Ga., comprises the lines and offices in the states of Virginia, North Carolina and South Carolina.

Second district, G. W. Ribble, superintendent, Atlanta, Ga., comprises the lines and offices in the states of Georgia and Florida, except Pensacola.

Third district, C. B. Arrington, superintendent, Atlanta, Ga., comprises the lines and offices in the states of Alabama, Louisiana and Mississippi, and Pensacola, Fla.

Fourth district, W. C. Daviet, superintendent, Atlanta, Ga., comprises the lines and offices in the states of Kentucky and Tennessee.

Melting Carbon.—It is reported in *Annalen der Physik* that La Rosa conducted experiments which indicate that carbon can be melted.

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Western Union Telegraph Company.

EXECUTIVE OFFICES.

Messrs. Belvidere Brooks, general manager; Mr. G. M. Yorke, engineer and W. N. Fashbaugh, traffic engineer, New York, have returned from their Western trip.

Mr. Belvidere Brooks, general manager, gave a reception to the messenger boys in Minneapolis during his recent visit in that city. He shook hands with the boys and greeted each with a few words of advice and cheer.

Mr. E. M. Mulford, division commercial superintendent and Mr. A. C. Kaufman, commercial agent, New York, have returned from a trip throughout the Maritime Provinces.

Mr. W. J. Dealy, general superintendent of the Commercial News Department, New York, is again at his desk much improved by his rest in the Adirondacks.

Mr. C. F. Ames, district commercial superintendent, Boston, Mass., and Mr. J. W. Reed, district commercial superintendent, Philadelphia, Pa., were recent executive office visitors.

Mr. T. E. Fleming, of the general manager's office, New York, is on a trip to Chicago and other Western points on company business.

Mr. C. B. Turpin recently manager of the Postal Telegraph-Cable Company's office at Salt Lake City, Utah, has been appointed manager of the Fresno, Cal., office of this company.

Mr. G. A. Lockwood has been appointed manager of the Portsmouth, Ohio, office of the Western Union Telegraph Company, vice Mr. Roy Zimmerman who has been transferred to the Cincinnati office.

This company has improved and extended its facilities between Boston and Canso, N. S., in order to better handle the increasing cable business between Boston and European points.

The office of this company at Columbus, Ohio, is being entirely remodeled both as to the telegraph and telephone equipments and facilities for handling a large increase of business will be provided.

Personal.

Mr. Franklin J. Scherrer of New York has returned from a business trip to Chicago and Omaha.

Mr. Ronald Mayer, identified with the telegraph department of the Texas Company at Houston, Tex., was a recent New York visitor.

Mr. W. H. Butler, assistant superintendent American District Telegraph Company of New Jersey, at Philadelphia, was a recent New York visitor.

Mr. F. G. Jones, identified with the Western Union Telegraph Company at Jacksonville, Fla., for many years, was a New York visitor last week and took occasion to call on many of his former friends.

Mr. Thomas A. Edison, accompanied by his son Charles, sailed for Europe August 2 on the steamer *Mauretania*. He will meet Mrs. Edison and Miss Madeline Edison in London, and the party will spend two months touring England and the Continent.

Mr. C. F. Annett, of Jerome, Idaho, a well-known old time telegrapher, is represented in a cartoon, among a lot of other public spirited men of Jerome, in a recent number of "Illustrated Idaho." Mr. Annett installed the first telephone in Idaho and the cartoon shows him holding a telephone in his lap. Mr. N. Annett, his son, is also pictured.

The Cable.

Extension of Pacific Cable.—The British Pacific Cable Board has been authorized to extend the Pacific cable from Australia to New Zealand.

Atlantic Cable Rates.—In the course of a discussion in the Canadian House of Commons recently, the Postmaster-General, Mr. Lemieux, stated that he had been informed by Mr. H. Samuel, Postmaster-General of England, that the English and German cable companies had agreed to a reduction of the rates to 6d. a word for "semi-urgent" messages not in code, but that the French companies were holding out against the reduction. It was hoped that the difficulty would soon be overcome.

The Telephone.

Telephone Chief Operators Meet.—The chief operators of the Southwestern Telegraph and Telephone Company held a conference in Little Rock, Ark., August 4 and 5, for the benefit of the service. Mr. L. M. Loring, division superintendent of traffic, presided.

Large Telephone Mortgage. — The Federal Telephone and Telegraph Company has filed at Buffalo, N. Y., a mortgage for $25,000,000 on its property in ten counties in Western New York. Various independent telephone companies were recently consolidated with the Federal company.

Telephone Consolidation in Colorado and Utah. —The Mountain States Telephone & Telegraph Company has been incorporated as a result of the merger of the Colorado Telephone Company and the Tri-State Telephone & Telegraph Company with the Rocky Mountain Bell Telephone Company.

Automatic Telephone Exchanges. — An automatic telephone exchange of the Strowger type is to be installed at Epsom, England, by the Post

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Office. For the purpose of comparison it has been decided to install one of the Lorimer system at Caterham, the capacity being 500 lines in each case.

Long Distance Telephony in Europe.—Telephonic communication was successfully established between Paris, France, and Aberdeen, Scotland, a distance of about 1,000 miles. Communication was made by way of London, Dover and Calais. It is stated that it was possible to hear quite distinctly and that there was no "buzzing."

Protest Against Advance of Telephone Rates.—The board of supervisors of the county of Orleans and the board of trustees of the village of Albion, N. Y., has filed a protest with the Public Service Commission, Second District, against the increase of rates by the New York Telephone Company in Albion and vicinity.

Telephone and Telegraph Stockholders.—The American Telephone and Telegraph Company has 50,000 stockholders, the Western Union Telegraph Company has 14,000, and The Mackay Companies' shareholders also run up well into the thousands. The United States Steel Corporation has 120,000, the Pennsylvania Railroad Company 65,000, and the Standard Oil Company 7,500. Notwithstanding the general outcry against trusts the number of stockholders in these large concerns is increasing rapidly. The stocks in any one of them, it may be stated, are widely distributed and are held chiefly by persons of moderate means.

Radio-Telegraphy.

High Power Wireless Station.—It is stated that the new wireless telegraph station at the Charlestown, Mass., Navy Yard will have twice the power of the present station.

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 for the corporation.

Wireless Telephony in Army Manoeuvres.—During the recent manœuvres of the National Guard at San Francisco the wireless telephone was successfully used in communicating with warships off shore.

Indicted for Tapping Wireless.—E. J. Earl, of Los Angeles, Cal., has been indicted for "tapping" a wireless and publishing a private message. This is a felony under the California laws and is punishable with a five-year imprisonment and a fine of $5,000.

Wireless Amateurs Organize.—The Rochester Wireless Association, which is composed of amateur wireless operators, has been organized in Rochester, N. Y. E. T. Eastman is president; M. D. Mosher, vice-president; G. A. Hickson, treasurer; J. M. Albert, engineer, and F. A. Wright, secretary.

Municipal Electricians.

Fire Alarm Wires Underground.—The fire alarm telegraph wires in Cincinnati, Ohio, are to be placed underground.

Association of Municipal Electricians to Meet in Atlantic City.

Owing to the death of S. W. Manning, superintendent of fire alarm telegraph, St. Paul, Minn., as announced in our issue for August 1, the executive committee of the International Association of Municipal Electricians, of which Mr. Manning was chairman, has decided to change the meeting place of the next convention from St. Paul to Atlantic City, N. J. The dates of the convention will not be changed, therefore the meeting will be held at Atlantic City, September 12, 13, 14 and 15. Young's Hotel has been selected as the headquarters, and ample space for exhibits of apparatus, etc., will be arranged for.

Mr. J. W. Kelly, Jr., chief of the electric bureau of Camden, N. J., has been detailed to make hotel and other arrangements at Atlantic City for the convention. Further information may be obtained from secretary C. R. George, Houston, Tex., or Mr. J. W. Kelly, Jr., Camden, N. J.

The change from St. Paul to Atlantic City will no doubt receive the hearty approval of the members, as that famous resort is more central and accessible and for these two reasons a larger number of members will be in attendance. Nothing will be left undone by those having the arrangements in charge to make this meeting a successful one in all respects.

As already announced, Mr. Manning was killed by an electric shock received while investigating some trouble on fire alarm wires at the fair grounds in St. Paul, on July 19.

Obituary.

Death of W. D. Sargent.

W. D. Sargent, aged 67 years, an old time and military telegrapher, and well known in telephone circles, died in Somerset, Pa., August 10. Mr. Sargent studied telegraphy at Harrisburg, Pa., and was in the United States Military Telegraph service in 1863. In 1866 he was manager of the Harrisburg office, and in 1871 was assistant electrician for the Western Union Telegraph Company at Chicago. He became interested in the telephone in Philadelphia in 1877 and was general manager of the telephone company in that city until 1882 when he accepted the position of vice-president and general manager of the New York and New Jersey Telephone Company, with headquarters in Brooklyn, N. Y. At the time of

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his death he was a director of the New York Telephone Company and a member of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps as well as of almost every other electrical organization.

He was one of the best known telephone officials in the United States and a man of lovable nature, which won for him a wide circle of friends.

J. C. Duncan, a member of the Military Telegraph Corps, died at Knoxville, Tenn., August 1.

L. Ford Perdue, a member of the United States Military Telegraph Corps, died at Terre Haute, Ind.

John E. Jayne, a member of the United States Military Telegraph Corps, died July 27 at Dewitt, Mich.

J. E. Neale, superintendent of telegraph of the Great Indian Peninsula Railway, died at Calcutta, India, recently. He was the inventor of the block signaling apparatus used on that and other lines in India.

Dr. P. J. Burns, a prominent physician in the Borough of the Bronx, New York City, and a former telegrapher, died in that borough, August 4. Dr. Burns was one of the most skilled operators for many years and graduated from the key to the practice of medicine in which he also became very proficient.

Frank B. Williams, chief operator of The Associated Press in Louisville, Ky., died in that city August 8. He was one of the first operators to be employed when that Association established its leased wire system in 1886, and was employed in the New Orleans office before going to Louisville. Mr. Williams established a record of receiving on the typewriter for a month without a break.

Joint Reunion of Old Timers and Military Telegraphers.

The interest in the approaching reunion at Atlantic City, N. J., on September 5, 6 and 7, of the Old Time Telegraphers' and Historical Association and the United States Military Telegraph Corps is growing rapidly and from present appearances there will be a large and especially representative attendance.

The military telegraphers are planning to make the fiftieth anniversary of the founding of their Corps an event of historical importance and no member of that Corps who can possibly be present should fail to answer to his name at the roll call which in the order of nature is certain to be the last for many of the present survivors.

The Old Timers proper will of course be on hand in large numbers. Unlike the Military Corps their ranks are always being refilled.

One feature of special and of general interest as well is that Mr. Edward L. Morse, of Stockbridge, Mass., a son of Professor Samuel F. B. Morse, the inventor of the telegraph, will attend the reunion and it is stated that Prof. Alexander Graham Bell, inventor of the telephone, may be induced to be present.

Honorable W. S. Jordan, Mayor of Jacksonville, Fla., is an old operator. He is a member of the Old Time Telegraphers' and Historical Association and has forwarded a pressing invitation on behalf of his city and many old time telegraphers to select Jacksonville as the Convention city for 1912.

Those desiring additional information should communicate with secretary F. J. Scherrer of the Old Time Telegraphers' and Historical Association, 30 Church Street, or Mr. D. H. Bates, secretary of the Society of the United States Military Telegraph Corps, 658 Broadway, New York.

The Resistance of Insulating Materials.

An investigation of the resistance of different forms of insulating material has recently been carried out by W. Deitrich, who has reported the results in the *Physikalische Zeitschrift*. The materials to be tested were in the form of cylindrical rods, which were connected to a charged electroscope and the rate of leakage observed. The insulation of hard rubber, caoutchouc, sealing wax, paraffin, etc., were found to be affected by the action of light, the material apparently acquiring a surface conductivity.

Moisture had a similar effect upon shellac, paraffin, beeswax, sealing wax and resin. Different kinds of wood were also investigated. When dry their insulation stood in the following order: pine, walnut, fir, beech, oak. When in a moist condition the order of insulation was oak, walnut, pine, fir, beech. In investigating different kinds of glass it was found that a gradual rise in temperature resulted in a gradual fall of resistance.

Origin of "Deadhead."—It is stated that "deadheads" originated in Pompeii where ivory markers were used as entrance checks to theatres. These checks were of different shapes to differentiate the various parts of the amphitheatre to which they gave admittance. Those for the top row were, for instance, represented by a bird, and those entitling the holder to free admission were small death's heads. Thus originated the expression "deadhead."

Exports of Electrical Apparatus.—During the fiscal year ended June 30 the value of electrical appliances exported from the United States was $10,700,000, as compared with $8,700,000 the year previous. The value of electrical machinery exported was $8,000,000, against $6,000,000 the previous year.

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Practical Aspects of Printing Telegraphy.

In our issue for June 1 we published an abstract of a paper entitled "Practical Aspects of Printing Telegraphy," read before the Institution of Electrical Engineers, London, by Mr. Donald Murray, inventor of the printing telegraph system bearing his name. Since the publication of the paper Mr. Murray has received from the Direction General of Russian Posts and Telegraphs an official letter giving some interesting information in regard to the employment of the Murray automatic system on the telegraph line between St. Petersburg and Omsk. The letter, translated into English, is as follows:

"In reply to your letter of February 28, 1911, concerning the adaptation of the Murray apparatus to the telegraph line Omsk—St. Petersburg, the Direction General has the honor to inform you that this line has a length of 3,557 kilometers (2,224 miles), and has three repeating stations, namely, at Riazan, Samara, and Tcheliabinsk, arranged at the following distances: St. Petersburg —Riazan, 865 kilometers (541 miles); Riazan—Samara, 872 kilometers (545 miles); Samara—Tcheliabinsk, 1,004 kilometers (628 miles); Tcheliabinsk—Omsk, 816 kilometers (510 miles).

"The line is of iron wire and measures six millimeters (0.236 inch) in diameter. It is worked duplex in an entirely satisfactory manner, and it is not necessary to revert to simplex except in the case of very bad atmospheric conditions.

"The regular operation of the Murray automatic apparatus on the St. Petersburg — Omsk line was inaugurated on April 19, 1908. The speed of transmission in each direction working duplex, is from fifty to sixty words a minute. The speed of transmission by the Wheatstone system on the same line did not attain more than thirty words a minute (six feet of tape), rarely thirty-five words (seven feet of tape), and under the very best conditions, and then only during very short periods of time, forty words a minute (eight feet of tape).

"The foregoing practical results show that the effective speed of transmission on this line is far below the theoretical speed obtained by calculation. This difference appears to be due not only to atmospheric conditions, but also to the influence of the self-induction of the line, and, above all to the influence of the induction of neighboring wires running parallel with this line over long distances."

The speeds are given in words per minute and are reckoned on the basis of five letters and a space equal to a letter per word. That is to say, they correspond to six typewriter letters or their equivalent space. The speeds of fifty-six to sixty words a minute are therefore equivalent to 336 to 360 letters per minute. The Wheatstone speeds are on the same basis.

Subscribe for Telegraph and Telephone Age. It is the leading paper of its class in America.

How Mr. Lincoln Received the News of His First Nomination.

In an address delivered before the Illinois State Historical Society, Mr. Clinton L. Conkling gave a very interesting account of how Mr. Abraham Lincoln received the news of his nomination by the Republican National Convention in Chicago, May 16, 1860, and described the part played by the telegraph in that memorable event. Mr. Lincoln was at Springfield at the time and received reports of the progress of events at the convention by telegrams, letters and persons returning from Chicago.

The following account of the service rendered by the telegraph on that occasion is taken from Mr. Conkling's address, which was published in the transactions of the Illinois State Historical Society, and the accompanying illustrations of the telegrams sent to Mr. Lincoln announcing his nomination were kindly loaned to us by the Society:

"The only wires into Springfield in 1860 were owned and operated by the Illinois and Mississippi Telegraph Company and were called the "Caton Lines" after Judge John D. Caton, of Ottawa, Ill., president of the company, and one of its organizers. Its principal office was at St. Louis. John James Speed Wilson, afterwards known as "Colonel Wilson," was superintendent of the Eastern Division, with headquarters at Springfield. Mr. E. D. L. Sweet was superintendent of the Western Division, with his office in Chicago. These divisions were afterwards called the Southern and Northern divisions, respectively. Mr. C. F. McIntire, with an operator named J. B. Pierce, was in charge of the local office in Springfield, which was then on the north side of the public square. Upon the absorption of the Illinois & Mississippi lines by the Western Union Telegraph Company in 1866, Mr. Sweet was appointed superintendent of the latter company, and upon his resignation in 1868, Colonel Wilson succeeded him and removed to Chicago. He continued in that position until 1879, when he resigned to go into other business. He died a few years afterwards. Mr. E. D. L. Sweet died in Chicago last March. During the convention he had charge of all the telegraphic arrangements. There was only one wire into the "Wigwam," and this was connected in the main office with the eastern wire of the Western Union—it being the general opinion that the nomination would go to an eastern man, Seward being the one most often mentioned in that respect. Mr. Wilson was in Chicago during the convention and divided his time between the main telegraph office, at the southeast corner of Lake and Clark streets, and the convention in the "Wigwam," a building erected for the occasion at the corner of Market and Lake streets. Most of the personal messages from delegates to Illinois points were sent from the convention hall to the main office of the Caton Company by messenger boys.

"In my possession are five original telegrams received by Mr. Lincoln on the day he was nominated. All are on the Illinois and Mississippi Telegraph Company form.

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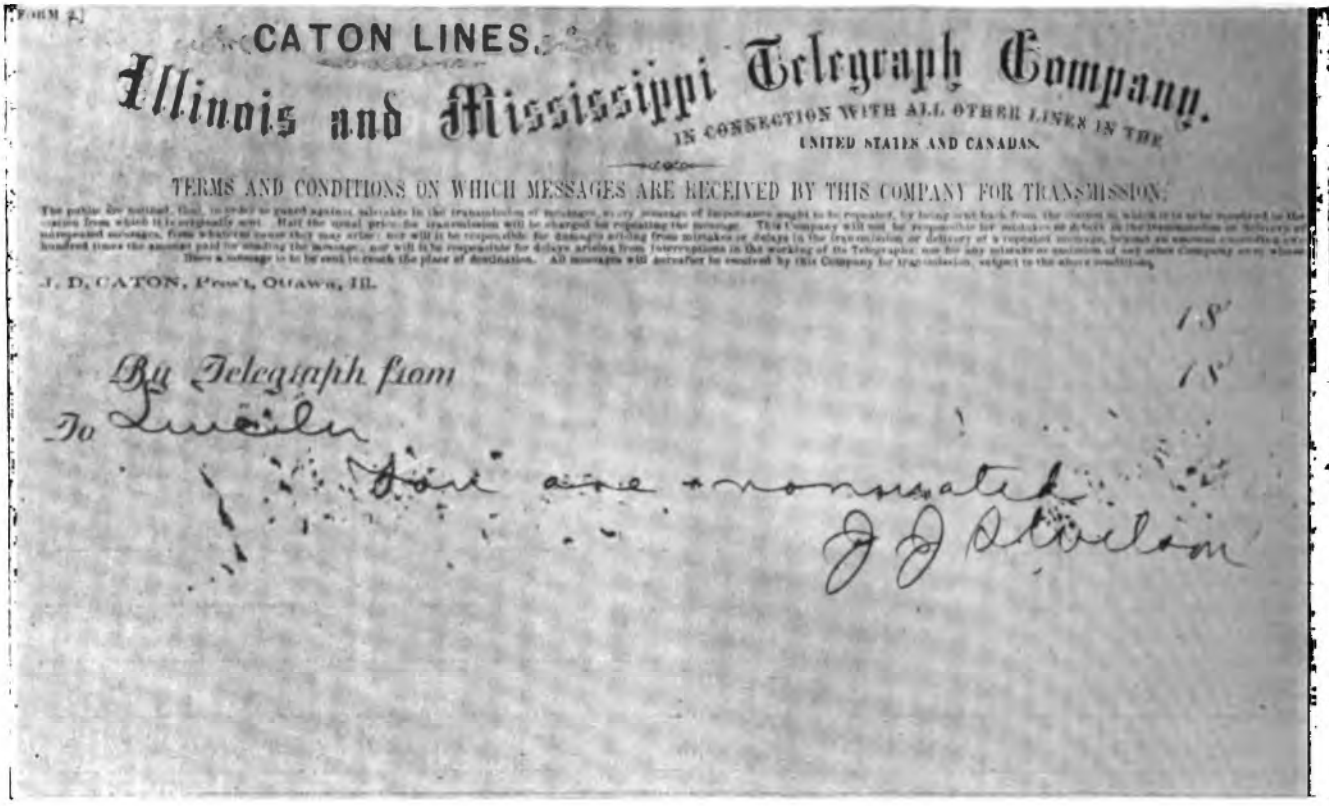

FIG. 1.—FIRST MESSAGE TO MR. LINCOLN ANNOUNCING HIS NOMINATION.

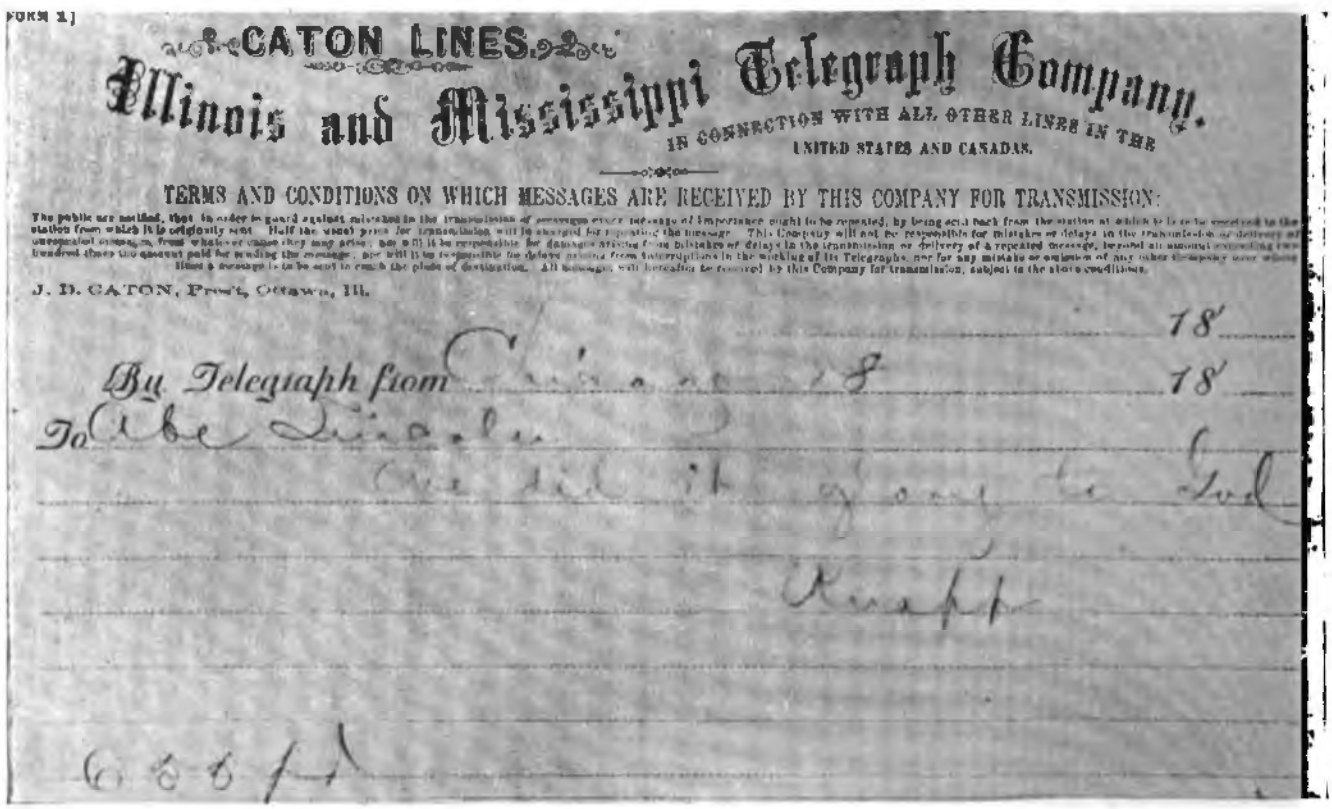

FIG. 2.—SECOND MESSAGE TO MR. LINCOLN.

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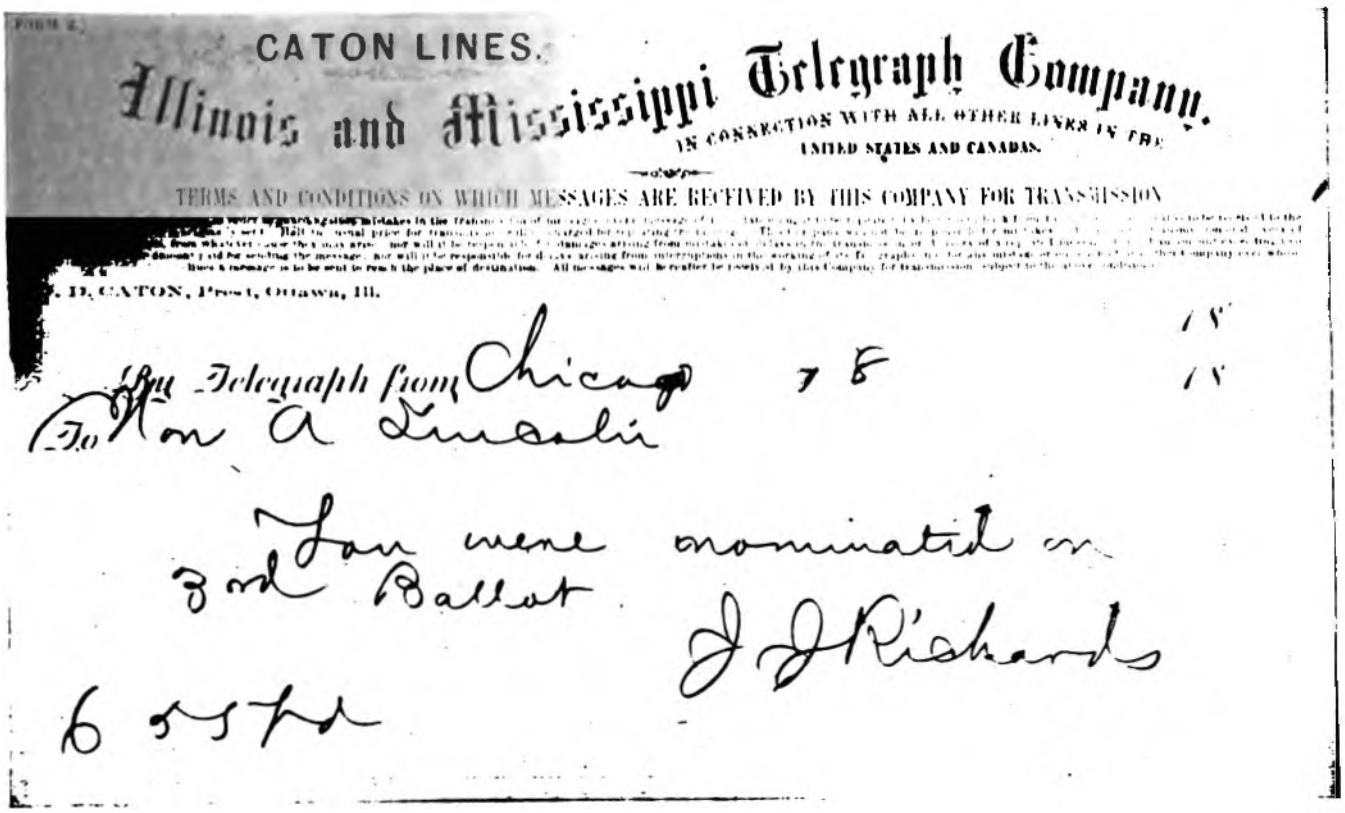


CATON LINES.

Illinois and Mississippi Telegraph Company.

IN CONNECTION WITH ALL OTHER LINES IN THE UNITED STATES AND CANADAS.

TERMS AND CONDITIONS ON WHICH MESSAGES ARE RECEIVED BY THIS COMPANY FOR TRANSMISSION

J. D. CATON, Prest, Ottawa, Ill.

18

By Telegraph from Chicago 18 18

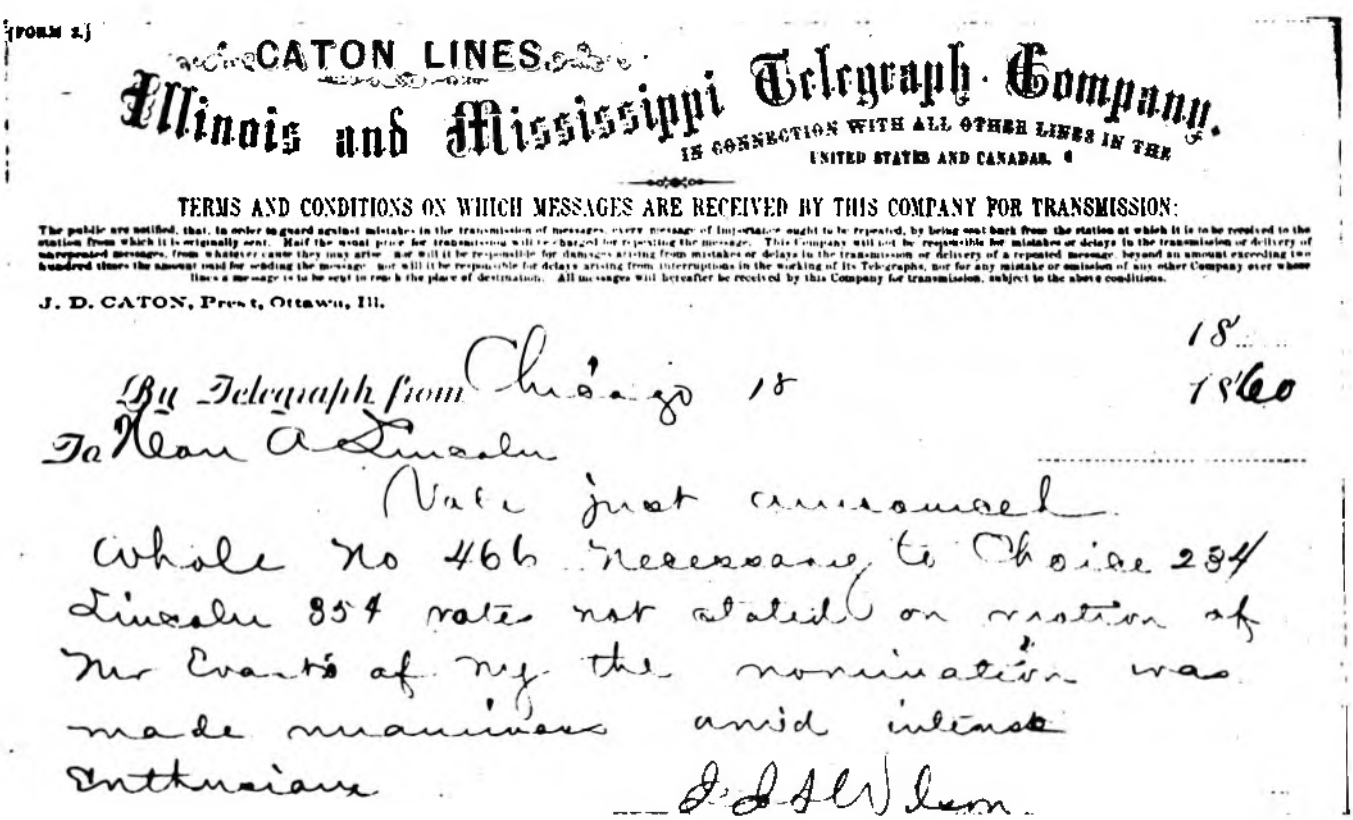
To Hon A Lincoln

You were nominated on 3rd Ballot

J J Richards

6 55 pd

FIG. 3.—ANOTHER MESSAGE TO MR. LINCOLN ANNOUNCING HIS NOMINATION.



[FORM 2.]

CATON LINES.

Illinois and Mississippi Telegraph Company.

IN CONNECTION WITH ALL OTHER LINES IN THE UNITED STATES AND CANADAS.

TERMS AND CONDITIONS ON WHICH MESSAGES ARE RECEIVED BY THIS COMPANY FOR TRANSMISSION:

The public are notified, that, in order to guard against mistakes in the transmission of messages, every message of importance ought to be repeated, by being sent back from the station at which it is to be received to the station from which it is originally sent. Half the usual price for transmission will be charged for repeating the message. This Company will not be responsible for mistakes or delays in the transmission or delivery of unrepeated messages, from whatever cause they may arise, nor will it be responsible for damages arising from mistakes or delays in the transmission or delivery of a repeated message, beyond an amount exceeding two hundred times the amount paid for sending the message, nor will it be responsible for delays arising from interruptions in the working of its Telegraphs, nor for any mistake or omission of any other Company over whose lines a message is to be sent to reach the place of destination. All messages will hereafter be received by this Company for transmission, subject to the above conditions.

J. D. CATON, Prest, Ottawa, Ill.

18

By Telegraph from Chicago 18 1860

To Hon A Lincoln

Vote just announced

Whole No 466 Necessary to Choice 234

Lincoln 354 votes not stated on motion of Mr Evans of Ny the nomination was made unanimous amid intense enthusiasm

J J Wilson

FIG. 4.—MESSAGE TO MR. LINCOLN ANNOUNCING DETAILS OF VOTE.

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"The first one sent was from the telegraph superintendent, Wilson, and shows signs of haste and bears no date. It reads:

"'To Lincoln:

"'You are nominated.

"'J. J. S. Wilson.'

"Mr. Pierce, the operator who received this message at Springfield, writes from Young America, Ill., under date of June 4, 1860, to Mr. Lincoln, saying that this was the first message for him announcing his nomination.

"A moment after this message was sent a messenger boy brought to the main office in Chicago a message addressed simply 'Abe,' and which read, 'We did it. Glory to God.' 'Knapp.' The receiving clerk brought the message to Mr. Sweet, calling his attention to the address, and also to the expression 'Glory to God.' Mr. Sweet directed that the words 'Lincoln, Springfield,' be added and that the message be sent at once.

"The next two telegrams are from J. J. Richards, who was well known in earlier days in Springfield. He was connected with the Great Western Railroad Company and was its agent for some time at Naples, which was then the end of the road. He subsequently went to Chicago.

"These telegrams are as follows:

"'May 18, 1860.

"'By Telegram from Chicago, 18 1860.

"'To Abraham Lincoln;

"'You'r nominated & elected.

"'J. J. Richards.

"'——————18——————

"'By Telegraph from Chicago 18——18——

"'To Hon. A. Lincoln:

"'You were nominated on 3rd ballot.

"'J. J. Richards.'

"Mr. J. J. S. Wilson followed his first message, probably within a very few moments, by another, which reads:

"'——————18——————

"'By Telegraph from Chicago 18 1860.

"'To Hon. A. Lincoln:

"'Vote just announced. Whole No., 466; necessary to choice, 234; Lincoln, 354 votes, not stated. On motion of Mr. Evarts of New York the nomination was made unanimous amid intense enthusiasm.

"'J. J. S. Wilson.'"

How the Kaiser's Telegram Went Astray.—The following story is told in England in connection with the investiture of the Prince of Wales at Carnarvon. In the course of the day a telegram reached the post office addressed "Prince of Wales, Carnarvon." It was handed to a boy messenger in the ordinary course, and without any special instructions, and he marched off with it to the Prince of Wales Hotel. The landlord opened the missive, and was aghast when he read the contents. It was a message of congratulations and good wishes to Prince Edward from the German Emperor. The telegram was immediately delivered in the proper quarter.

QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. Having completely covered Mr. Jones' book we are now covering "The Quadruplex," by Maver and Davis, and will bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER VII. *(Continued.)*

Referring to Fig. 29, what is the bar of the pole-changer electrically connected with?

After leaving the pole-changer the circuit divides. What is the course of each part?

Which battery supplies the current that passes in and out of the home artificial line?

In Fig. 30 what is the resistance Q' placed between the condenser and rheostat wire for?

In balancing a quadruplex what is the effect of grounding the wire at the distant station?

When a line is thus grounded why is the previous balance not disturbed, when the resistance of the battery is removed by turning the switch?

After restoring the full battery power to the line how is the balance obtained?

If the polar relay responds to the motions of the pole changer what does it indicate?

How is this action neutralized?

How is the polar duplex balanced?

How is the Stearns duplex balanced?

CHAPTER VIII.

In introducing the dynamo-electric machine as a means of supplying energy for the operation of duplexes and quadruplexes, why was it necessary to alter the arrangement of the instruments?

How many grades of potential are supplied by these machines?

What are the values of the potentials?

Why are resistance coils placed between the generators and the wires?

What are the resistances of the various coils used for this purpose?

What potential is used for long quadruplex circuits?

What wires are supplied by current of the first potential?

What by the second and third potentials?

For short wires what potential is used?

How is the resistance of these wires increased?

Is the current supplied by generators limited?

What effect has the movements of the transmitter upon the current?

What effect has the action of the polechanger upon the current?

TELEGRAPH AND TELEPHONE AGE is the leading paper in these two fields and is progressive and newsy. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - Editor and Publisher
253 BROADWAY, NEW YORK
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CABLE ADDRESS: "Telegage," New York.
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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.

August 16, 1911.

Long-Distance Telegraphy.

It has been stated in electrical engineering circles that telegraphy has practically reached the limitations of development and that it is at a standstill, but those who are familiar with the facts know that nothing is further from the truth. The mistake made by those who take this view of the matter rests on the assumption that because the telegraph is the oldest of the electrical arts it must necessarily be dormant as far as progress and improvement are concerned, if not decadent.

The later electrical developments, such as electric lighting, the electric railway, etc., have occupied the stage for several years simply because they are comparatively new and in the development stage, but they, too, are advancing toward the point where startling changes may no longer be looked for. From that point improvement will be attained through refinement of existing apparatus and processes as is being done in the telegraph and the telephone today. The telegraph particularly is undergoing a refining process at the present time that was not even dreamt of a few years ago. The spirit of progress and improvement has come to the front and truly wonderful things are being accomplished in a quiet way.

One of the greatest achievements in telegraphy in recent years is the increase in the range of operation of the wires. A few years ago the longest regular circuit worked out of New York was to New Orleans, and, when conditions were favorable Galveston was directly connected. Improvements in apparatus and line construction have rendered it feasible to span the continent with an unbroken line of communication. Chicago used to be the practical limit of operation direct from New York, and all business for the West was sent to that office for distribution to destination. Now, Chicago and other former large repeating points are relieved of much of the great volume of traffic by handling direct business between large centers. At the present time New York is in regular direct communication with St. Paul and Minneapolis, Denver, Salt Lake City, San Francisco, Los Angeles, Seattle, and all other important points in the West; Dallas, Houston, Galveston, etc., in the Southwest and Havana, Cuba, and circuits are established direct to other points as business warrants such special facilities. Of course it is understood that these long circuits are not composed of one direct wire between the terminal points. They are divided into sections by repeaters and there is no physical reason why lines many times as long cannot be operated directly by means of this important apparatus, the repeater. Indeed, one cable company works direct from New York to Buenos Ayres, Argentina, a distance of 8,000 miles by the aid of repeaters, and another from New York to Emden, Germany, 4,300 miles.

The most important advantage gained by these improved methods of handling business is the saving of time and the reduction of the liability to error. These two factors are probably the most important a telegraph company has to consider with respect to its functions as a public service corporation, and the more it succeeds in eliminating them the better it will serve its purpose and live up to the quality of service a telegraph company should give to its patrons.

The Value of Study.

The value to students of technical telegraphy of our "Answers to Questions" column is evidenced by the number of letters we receive bearing on the subject. The great value of the matter lies in the necessity of investigation and inquiry and getting underneath the surface of things to find out why. The mere statement that a sounder works when an electric current passes through the coils does not mean much, but when the question "Why?" is applied to the case a wide field of investigation is opened up and the possibility of much extended and real knowledge on the subject is laid within the grasp of the student. All he has to do is to diligently use his thinking faculties and ask and answer questions and knowledge will come to him.

The quadruplex and the duplex and accessory apparatus constitute the subject of investigation in this column at the present time and on account of the growing importance of these systems of telegraphy deep interest is being shown in them by students. Apart from the mental satisfaction that comes with the increase of knowledge, the specific information gained by study of these questions is of the highest value to the student as it broadens his mental horizon and fits him to fill higher positions. The call to step up higher may come at any time and the more an operator

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knows about the whys and wherefores of his business the more is he likely to be called upon to exercise his knowledge for the benefit of the company employing him.

Every operator should find out as far as he can the cause of things and not be contented with effects alone. An effect does not tell us anything except that there is a cause back of it. An operator can work a wire, but can he connect the wire; select and assemble the proper instruments, generators, switches, batteries, etc., and put them together so as to produce a workable circuit? That is the kind of knowledge the telegraph companies need in their men.

A Good Example.

The Western Union messenger boys of St. Paul evinced as much pleasure and pride at having been greeted by General Manager Belvidere Brooks in that city recently as does the average farmer in shaking hands with the President of the United States. The effect in both cases is to promote loyalty, one to the employer and the other to the state, and no doubt it would be beneficial on both sides if the practice of bringing superiors and subordinates together were indulged in more frequently. The employes would feel the stimulus for good engendered by occasional social communion with their superiors and the companies would be benefited thereby. Let the officials show more interest in the welfare of the employes and peace and harmony in the service will be promoted and realized.

Mr. Brooks himself was once a messenger and it is gratifying to note that he appreciates the fact that the messenger of to-day is just as human as in the time when he was one of them and is as sensitive and appreciative of encouragement and a good word now and then from the superior officers.

Notifying Mr. Lincoln of His Nomination for President.

One of the greatest figures in American history is Abraham Lincoln and people never tire of reading about his character and achievements. Mr. Lincoln had a familiar knowledge of the telegraph by reason of the circumstances existing at the time of his incumbency as president of the United States and anything that connects him with the service is of perennial interest to telegraph people.

A very interesting lecture was delivered by Mr. C. L. Conkling before the Illinois State Historical Society in which that gentleman told how Mr. Lincoln, in 1860, received the news of his nomination for the presidency. The telegraph of course was the means utilized, and Mr. Conkling exhibited the original telegrams conveying the announcement to Mr. Lincoln. Four of these we have the pleasure of reproducing elsewhere in this issue, together with the story of their origin and delivery.

The article contains facts of much telegraphic as well as historical interest and will no doubt be read with much pleasure and profit.

Corrosion of Lead Sheaths of Telegraph Cables by Stray Electric Currents.

Prof. Pionchon has been investigating the corrosion of lead sheaths of telegraph cables by stray currents in Dijon, France, and *La Revue Electrique* of Paris contains a report of the results.

By taking continuous records of the potential difference between two points in the water pipes, Prof. Pionchon showed that an electric current was flowing through the same; at night time when the street railways were not running the registration became a straight line, and during the day electrical conditions were dependent upon the operation of the cars. Analogous results were obtained by measuring the difference in potential between the flowing water and a nearby railway track, the voltage reaching a value as high as twelve volts. Similar results were obtained between telegraph cables and the rails, the observed voltage being considerably in excess of any that might be formed by lead, earth and rails acting as a primary battery. The direction of the current flow was from the lead cable-covering to the rails, and consequently the lead became corroded. As a further test of the fact that current was flowing from the lead sheath, cotton which had been soaked in a solution of potassium iodide was placed between the lead sheath and the wall of the conduit. This cotton became discolored within a few hours by the passage of current in the day time, but at night no effect was observed. In other parts of the city it was found that the direction of current flow was away from the rail and as high as twenty-five volts was observed at certain points.

Telepost Employes Strike.

The offices of the Telepost Telegraph Company in St. Louis, Sedalia and Kansas City, Mo., and Chicago, were closed July 31. It is stated that dissatisfaction over irregularity in paying salaries was the cause of the trouble and that a number of the employes claim that three weeks' salaries have not been paid. Mr. H. Lee Sellers, of New York, president of the company, stated that the difficulty is only temporary.

The company had a line between Chicago and St. Louis, part of which was leased from an independent telephone company. This line was in continual trouble and on account of this the situation became so acute that the Telepost Company strung a wire of its own in place of the one leased. Subsequent work on the line kept the wire out of commission a great part of the time, and under such circumstances business suffered. He has been assured by every one of the company's managers that if the wires could be relied upon the business would largely increase, and, he states, the company "would be on a very satisfactory profit earning basis."

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Aspects of "Public Ownership."*

BY SYDNEY BROOKS.

The area within which public ownership may safely be invoked by all municipalities in all lands is, in short, extremely small; and the far larger and more debatable area within which public ownership fails at one spot and succeeds at another is so broken up by the infinite variety of local conditions as almost to defy classification or description as a whole. * * * We want to know the best method of regulating public utilities that are owned and operated by private corporations. We want to ascertain, if possible, some fairly broad and not too rigid principle that would help us to separate the services that ought to be taken over by the municipality or the State from those that might legitimately be left in private hands. We want, again, to strike an approximate balance between (1) public ownership combined with the lease of the undertaking to an unofficial corporation, (2) public ownership combined with public operation, and (3) private ownership and private operation under public control. Assuming that the advantage is found to lie with the system of public ownership combined with public operation, we want, next, to discover how this system works—what are its financial effects in relieving taxation or in increasing local indebtedness, whether the services it supplies are of a better quality and lower in price than those which might be obtained from a properly regulated private company, what consequences result from the creation of a body of privileged workmen drawing higher pay from the public authority than they would receive from an ordinary employer, how far the expansion of State and municipal activities and the increase of State and municipal employment of labor affect the tone and character of politics and the interest of the people in their civic and national affairs, how far they react upon private enterprise and influence the flow of capital and the state of the labor market, and what, finally, are the conditions, political, legal, administrative and "atmospheric," that give to public ownership its best chance of success.

Preservation of Pole Timbers.

Bulletin No. 84, recently issued by the United States Forest Service, is devoted to the preservative treatment of poles. Present knowledge of the results of the creoscte treatment of wooden poles is based largely on treatments made by the pressure method, using from eight to twelve pounds, or more, of creosote to a cubic foot of timber. The expense incident to such treatment has been the chief hindrance to its more general adoption for poles. Investigations of the Forest Service have therefore been concerned with treatments which could be applied locally without the erection of elaborate and extensive plants. Much attention has also been given to the seasoning of poles, since proper seasoning not only prepares poles to receive the preservative, but under certain conditions may be in itself a means of increasing their durability.

Seasoning of poles reduces their weight usually from sixteen to thirty per cent., and even more for some species. In general, poles cut during the spring and summer lose weight most rapidly; those cut during the autumn and winter lose less rapidly, but more regularly.

Preservative applied to the surface of a pole by a brush may add from one to two years to the life of timber, but permanent protection should not be expected from the application of so small a quantity of the material. If the butt be more deeply impregnated, the life of the pole will probably be limited by the life of the top rather than by that of the butt. A life of twenty years for butt-treated chestnut and western cedar, and twenty-two years for northern white cedar poles is believed to be a conservative estimate. In the drier western climate butt-treated pine poles can probably be depended on to give twenty years' service.

Impregnation of many pole timbers may be accomplished in open tanks, without the use of artificial pressure, by immersion in hot and cold preservatives, the cold following the hot. The open-tank process has the advantage that it is possible to apply the preservative to the butts only, with a great saving in the creosote.

Conversion Factors.

The following tables will be found useful for converting English units of measure into metric units, and vice versa:

MEASURES OF LENGTH.			
Millimeters	×	0.04	= inches
Inches	×	25.	= millimeters
Centimeters	×	0.4	= inches
Inches	×	2.5	= centimeters
Meters	×	3.28	= feet
Feet	×	0.31	= meters
Kilometers	×	0.621	= miles
Miles	×	1.61	= kilometers
Kilometers	×	3281	= feet
Feet	×	0.0003	= kilometers
MEASURES OF CAPACITY.			
Cubic centimeters	×	0.06	= cubic inches
Cubic inches	×	16.4	= cubic centimeters
Cubic meters	×	35.3	= cubic feet
Cubic feet	×	0.03	= cubic meters
Liters	×	1.06	= quarts
Quarts	×	0.95	= liters
MEASURES OF AREA.			
Square centimeters	×	0.16	= square inches
Square inches	×	6.45	= square centimeters
Square meters	×	10.77	= square feet
Square feet	×	0.09	= square meters
MEASURES OF WEIGHT.			
Grammes	×	15.4	= grains
Grains	×	0.06	= grammes
Kilogrammes	×	2.20	= pounds (avoir.)
Pounds (avoir.)	×	0.45	= kilogrammes

*"The North American Review" for August.

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High Speed Automatic Perforators.

BY DONALD MURRAY, LONDON, ENGLAND.

In reference to the very interesting article on high speed automatic perforators by Mr. William Maver, jr., in your issue of July 16, the following points that have occurred to me may perhaps be worth publishing.

The use of a high speed perforator to perforate tape purely for retransmission (in order to regenerate signals on a long line) is of doubtful utility. Any paper perforating mechanism is necessarily complicated and needs frequent skilled attention. A duplex line would require two sets of these retransmission perforators at the repeating station, and two sets of paper rolls. Assuming that the circuit exchanged 1,000 messages a day there would be required ten coils of eight-inch Wheatstone tape, amounting to over one ton of paper tape per annum, costing not less than $250 for paper alone, to say nothing of the cost of the apparatus and the skilled mechanical and other attention required. There are also the errors and break-downs inevitable with such apparatus.

I speak from experience because the Murray automatic system was one of the first of the high-speed automatic telegraphs that exactly reproduced the perforated transmitting tape at the receiving station. The Russian administration was struck by the possibilities of automatic retransmission for regenerating the signals on long lines, and tried the Murray automatic system in this way. The experiment, however, was soon abandoned as not being worth while. It was found preferable to work the Murray automatic system through ordinary Wheatstone duplex repeaters.

On the other hand for a telegraphic receiving and distributing centre, the received perforated tape will undoubtedly prove very useful in future years. It is obviously a valuable facility if messages can be received, say in Chicago from New York, in the form of perforated tape and sorted out and automatically retransmitted over various circuits.

For purely regenerative automatic retransmission of signals a much better plan than the employment of perforated receiving tape is in use in connection with the Baudot system, and the principle can be applied also to other multiplex systems such as the Rowland, and the Murray multiplex. It is a purely mechanical system of regenerating the signals at a repeating station without the use of tape. In the Baudot it is a distributor that receives the worn out and distorted signals and sends them on as perfect new signals equal to the originals. There are many of these retransmitting stations on the continent of Europe; for instance, on the Baudot quadruple line between Paris and Berlin there is one of these mechanical regenerating repeaters at Coblenz.

I have devised a similar arrangement for the Murray automatic system. The apparatus in this case can be made for about $200 or for about $400 in the case of a duplex repeating station, that is to say for less than the cost of two years supply of paper tape for the perforated tape plan. The principle is the same as in the Baudot, and the signals are retransmitted as good as new. There is no tape. It is purely a mechanical contrivance. It will repeat Morse signals as readily as it does the Baudot signals employed in the Murray automatic system. The speed in the case of Morse signals is limited to about 100 words a minute, but this is ample for long lines. The one drawback to the arrangement is that the speed must be uniform. This condition applies also to the Baudot and all the other mechanical regenerators yet invented. Theoretically it should be possible to make a Morse signal regenerator which would be free from this necessity for uniform speed.

Diseases of Storage Batteries and Their Cure.

Storage batteries, like any other mechanical contrivance, are subject to troubles; but they have troubles of their own besides, that are not to be found in any other energy-producing machine. These troubles are of a chemical nature, and are so insidious and detrimental to the operation and life of the storage battery that they have received very careful investigation. Fortunately the nature of these diseases are now so well understood that the proper remedies can be applied.

The following description of the diseases of storage batteries and their remedies, taken from Dr. Watson's book on storage batteries, covers the subject very concisely.

Diseases of the apparently mechanical order are the buckling, warping, or other distortions of plates, flaking off or falling out of the active material, and hardening or crumbling of plates due to exposure to air. It is rather remarkable how fully these causes, together with kindred ones such as loss of capacity, reversal of negative plates, and internal discharge, can be attributed to "over-sulphation," or what is more commonly called merely "sulphating."

As seen from the equations that denote the probable chemical actions during the charge, the lead is first changed into the sulphate and then into the spongy metallic or highly oxidized condition; that is, the sulphate is a natural stage between the two extreme conditions found on negative and positive plates. In the normal action of the cell, sulphate is formed no faster than it can be reduced to either of these two forms by the action of the current. Also, during the discharge, both plates tend to return to the condition of the sulphate. If an excess of sulphate is formed, a cell may be expected to manifest it in some or all of the manners just mentioned.

The sulphate in itself is almost a non-conducting body, and when on a plate it effectually removes the covered portion from further action. Acid that is too strong or too weak is conducive to this formation, likewise long periods between use and successive charging. Of course, the sul-

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phate forms unevenly on the outer surfaces of plates, therefore leaving some parts more active than others, and though the grids may be of symmetrical shape and of equal mechanical strength in different parts, serious warping may result. Films of sulphate may form between the active material and the walls of the grids, thereby leaving the pellets quite insulated from the main circuit. The charging would then be confined to a smaller than the expected quantity of material, and the capacity of the cell be proportionately reduced. With its proper hold on the grids relaxed, the pellets will flake or fall out, resulting in a permanent loss of actual volume of plate. With only a small resulting capacity, such cells are more quickly discharged than those in proper condition, and if the normal discharge is maintained, current from the other cells will continue to flow through the exhausted ones, and reverse their polarity.

The sulphate is readily detected by its white color, and is usually to be looked for on the negative plates only. The outer and visible surfaces of these plates may exhibit some sulphate, even when the other parts are healthy, for these surfaces are so remote from positives as to be largely inert.

Three practical methods may be followed for removal of the undesirable sulphate, depending upon the size of cells and means at hand, as well as upon the severity of the case; the user would select the one most available of the three.

One method is to charge the cells at a slow rate for a long time. Where no immediate urgency for the use of the cells exists, this is perhaps the most practicable plan. If the main cells are in daily use, the defective ones may receive an equivalent treatment by connecting *them* in on the charge, but switching or cutting them out of circuit during the discharge. Large cells, in which the positives of one are permanently joined to the negative of the next, could obviously not utilize this method. A whole double set of plates would require removal and the substitution of a spare set while the faulty ones were being treated in some special vessel. A more common method is to saw off the faulty plates, one by one, replacing them as fast as removed by new or freshened ones.

A second method, highly practical and effective, is temporarily to reverse the negative plates. This process should be carried out, not with the regular positives, or they would be seriously injured, but with "dummies," mere slabs of sheet lead used as positives. By this reversed action of the current, the sulphate will be thoroughly converted to peroxide, and then when returned to regular formation there will be the normal quantity of spongy lead free from excess of sulphate. Except for such actual loss of material as may have resulted from flaking, this process restores a plate to almost its original vigor.

A third method may be followed when it is imperative to repair a cell in the shortest possible time, or when the plates have long been dry and exposed to the air. Carbonate of soda is added to the electrolyte, and the normal charging rate maintained until the plates resume their normal color. When restored in this manner, the contaminated solution must be withdrawn, the plates thoroughly washed and set up with fresh solution.

Aside from the internal discharge between plates due to the bridging of pellets of active material, dislodged by sulphating or other causes, discharge may result from the presence of impurities contained in the original materials or absorbed from the air. Particularly pernicious is the presence of even small traces of nitric acid that may have been used in the forming processes. If cells are located in a stable or near refrigerating apparatus, from which ammonia fumes may be absorbed, nitric acid will at once be produced, and the cells possibly ruined. If such locations are unavoidable, the use of a layer of paraffin oil on the electrolyte is an effective safeguard.

From some unexplained reason, direct sunlight seems to encourage the warping of plates. Therefore, while it is highly desirable to locate batteries in places where plenty of light may be had to allow for thorough inspection, an excess should be avoided; direct sunlight, too, would produce unnecessary evaporation of the electrolyte. Heat is conducive to chemical action. At ordinary temperatures a substance may be quite unacted upon in a given solution, but let the liquid be heated, say to boiling, and dissolution or other action may quickly follow. So with the storage cell. At ordinary temperatures the unwanted actions may be entirely absent, but in a room heated to over 100° F. these chemical changes may be permitted. It is certain that temperatures uncomfortable to person are also unfavorable to battery maintenance.

New Book.

Wireless "Hook-Ups" is the title of an 88-page booklet gotten up by H. Gernsback and issued by the Modern Electrics Publication, New York. The matter consists of a complete collection of wireless telegraph and telephone diagrams for wireless experimenters, with a chapter on the study of diagrams. The booklet contains 165 illustrations of different "hook-ups," besides others, making a total of 171. The various illustrations are clearly drawn so that the amateur will have no trouble in tracing the connections and circuits. The pamphlet does not pretend to be the final word on the subject, but merely an aid to amateurs to get the best results from their equipment. All of the standard and other wireless systems are represented.

The price of this book is 25 cents, and copies can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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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.]

(60) Q. What is the value of one lux in the measurement of illumination? W. T.

A. The magnitude of one lux is approximately 1/12 foot-candle. The foot-candle is the illumination of one standard candle at a distance of one foot.

(61) Q. What is the present market price of radium? P. M.

A. Radium is such a scarce and precious substance that it can hardly be said that there is a market for it. A gram of radium, costing $72,000, was presented by Sir Ernest Cassel to the British Radium Institute. As there are 454 grams in one pound, it can be easily calculated what a pound of radium is worth, at that rate. But there is not a pound of radium in the world, and any one having a few grains of it lying around loose better take what he can get for it and not wait for a market quotation.

(62) Q. Of what material are the standard insulators in this country made, and are the same kinds of insulators used in England? I have been told that different insulators are used in the latter country. C. A. C.

A. Glass is the standard material for insulators in this country, although porcelain insulators are becoming more and more used. In England glass insulators are almost unknown, ninety-five per cent. of the insulators now in use being of porcelain, the rest being of stone ware. An excellent article on porcelain and glass insulators was published in our issue for January 16.

(63) Q. (1) What insulating material is used for long submarine cables, and (2) is an Atlantic cable of the same size throughout is entire length? G. P.

A. Gutta percha is almost universally used, because its electrical, physical and mechanical qualities improve from submergence at great depths. Vulcanized rubber is also frequently used as insulation, especially for cables laid in certain tropical waters where the teredo attacks gutta percha. (2) A deep sea cable is not the same size its entire length. It is made up of three sizes: the shore end, the intermediate, and the deep-sea.

Measuring the Length of Wires by Vibrations.

Mr. C. A. Smith of Birmingham, England, describes in *The Electrical Review* of London the results of some experiments which he recently conducted with a view to determine distance by means of vibrating wires.

The method is both accurate and simple, he states, and should have an important application to the measurement of distances betwen poles or wire supports, when the bases are inaccessible. Such cases frequently occur where the wires cross over house property, and particularly abroad, where they pass over mountain gorges, and over water or swamps.

Referring to the propagation of wave motion in a horizontally suspended wire, supported at both ends, if the wire be struck, or "plucked," near one end, a transverse wave results, which travels at a uniform velocity to the distant end. On reaching the far end, it is reflected, and continues to traverse the wire to and fro several times, always maintaining the same velocity, but gradually falling in amplitude.

Since the velocity is uniform, it follows from the equation expressing the velocity of propagation of waves along a stretched wire or cord, that, if we know the exact time in seconds taken for the pulse to reach the distant end, also the tension applied to the wire, and its weight per unit length, it becomes a simple matter to calculate the length or distance traversed.

The equation, which may be found in any text book on physics, is

$$v = \sqrt{\frac{T}{m}}$$

where T is the tension applied and m is the mass of unit length of the wire in absolute units.

In the experiments Mr. Smith used a dynamometer to determine the tension upon the wire to be measured. At each tension the wire is struck at a convenient distance from the draw-tongs and the exact time observed for the fifth return to reach the experimenter's hand held on the wire. This time interval is divided by ten to give the time taken for the wave to travel in one direction. Several readings should be taken at each tension and plotted as ordinates on cross section paper, the abscissas representing time. From a curve thus drawn the distances can be readily calculated.

New Directors and Officers of Westinghouse Company.

At the adjourned meeting of the stockholders of the Westinghouse Electric & Manufacturing Company, held July 29, directors were chosen as follows: James S. Kuhn, Edward M. Herr, Pittsburg; Edward F. Atkins, Boston; Charles T. Brooker, Ansonia, Conn., and Harrison Nesbit of Pittsburg. Robert Mather was chosen chairman of the corporation, and the following officers were elected: President, Edward M. Herr; vice-presidents, Loyall A. Osborne, Charles A. Terry and Harry P. Davids; acting vice-presidents, George W. Hebard and H. D. Shutte; controller and secretary, James C. Bennett; treasurer and assistant secretary, T. W. Siemon; assistant secretary, Warren H. Jones; assistant treasurer, H. F. Baetz; acting assistant treasurer, S. H. Anderson; auditor, F. E. Craig, and assistant auditor, W. B. Covil, Jr.

The new president, Mr. Herr, has since 1905 been vice-president of the company in active charge of its manufacturing commercial operations.

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Observations on Telephone Transmission.*

BY J. L. MCQUARRIE, OF NEW YORK.

(*Concluded from page 512.*)

To one called upon to furnish telephone facilities the important problem is to determine in detail what construction should be employed in order to obtain the required result at a minimum cost. The difference in price between the very best and an inferior instrument is so small that there should be no excuse from a financial point of view for the purchase of inferior transmitting or receiving apparatus. Compared with the cost of the lines, the differences in the price between the very best telephone apparatus and the poorest is infinitesimal. The largest economies, therefore, which it is possible for one planning a telephone system to achieve are accomplished by savings in line construction and by the use of such methods of operation as will secure the maximum use of the facilities provided.

In dealing with this phase of the problem it is first necessary to establish a standard of transmission which it is desired to furnish. Preferably this standard of transmission should be expressed in miles of standard cable, although if it is so desired it can be expressed in terms of an open wire copper circuit of a given loop resistance or weight per conductor per mile. If different classes of lines are to be considered, it may be advisable to have two standards, one for a certain class of service, perhaps the bulk of that which is being considered; the other for a certain special class of service which represents but a small percentage of the total amount. For instance, it might be desirable to fix for certain classes of service a 20-mile standard, while for other classes of service a 30-mile standard might be considered satisfactory.

Having established the standard of transmission, I may point out certain general principles for guidance in determining the most suitable construction. If the circuits are to be wholly of open wire, the problem is comparatively simple. If copper wire is to be used, mechanical strength limits the engineer to the use of wire not below 160 or 175 pounds in weight, although climatic conditions, such as sleet or high winds, must be taken into consideration. Very approximately where copper is used the length of line over which it is possible to give the desired standard of transmission is inversely proportional to the resistance of the circuit per loop mile. To illustrate, if transmission between two substations of a standard type is satisfactory over a 400-mile line of 210-pound copper wire having a loop resistance per mile of approximately 8.5 ohms, then an equal grade of transmission can be given over a circuit 200 miles in length by using copper wire weighing approximately 105 pounds per mile and having a resistance of approximately 17.0 ohms per loop mile. However, as the latter size of wire under ordinary conditions does not possess satisfactory mechanical strength, it is necessary either to use larger copper wire or to use bi-metallic wire, selecting in this case a size and grade of wire which will provide mechanical strength with a resistance not in excess of that of the 105-pound copper conductor, or 17.0 ohms per loop mile.

In the case of cables, the transmission efficiency varies inversely as the square root of the product of the loop resistance and the mutual capacity. Diverging for a moment, since in the past there has been some confusion in regard to the capacity of a cable as affecting transmission, it may here be emphasized that it is the mutual capacity between wires of the pair and not the grounded capacity of a wire or conductor which influences the transmission. However, it can be added that for ordinary paper insulated lead covered cables the ratio of the mutual to the grounded capacity is nearly constant, being approximately two-thirds. Hence, if in one case the mutual capacity is known and in the other only the grounded is available, it is possible to compute the mutual capacity in the latter case and then compare the two cables.

Regarding the capacity of cables, it may be pointed out that, in order to obtain a change in mutual capacity of, say, from .070 to .054 microfarad per mile, it is necessary to very greatly reduce the number of pairs in a cable having a given sized sheath, the reduction in some cases being almost as great as 50 per cent. While it is not possible to formulate a rule applicable to all cases, it has in general been found to be economical to use cable having a reasonably high capacity, that is, a rather compact cable, and then where necessary to increase the transmission efficiency by increasing the size of the conductor one gauge rather than to attempt to secure the transmission gain by a low capacity. This is especially true when the price of copper is low.

The foregoing directions apply to cases where the transmission circuit is wholly a cable line or wholly an open wire line. If of necessity the circuit must be carried for part of the distance in cable and part of the distance in open wire, the problem is much more complicated, since in order to obtain a standard grade of transmission at a minimum cost it is necessary to so proportion the cost of the cable portion of the circuit and the cost of the open wire portion of the circuit as to produce a minimum cost for the whole line.

As the satisfactory quality of telephone transmission depends to a large extent on what is usually termed the maintenance of the telephone lines, it may be of interest to emphasize certain features involved in maintenance. Poor maintenance results in three defective conditions:

1. Decrease in actual telephonic efficiency; that is, the telephone currents themselves, are not transmitted with full efficiency.

2. Noise due to leaks to ground or to adjacent lines, which may be either telegraph, power or lighting circuits.

3. Crosstalk or overhearing from adjacent circuits.

As far as the electrical requirements are concerned maintenance should care for the following

* Abstract of paper read at the Boston convention of the Association of Railway Telegraph Superintendents, June 26-30.

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points: In order to prevent a reduction in actual transmission efficiency the maintenance should be of such a character that under no conditions of weather will the insulation between the two sides of the circuit fall below a certain permissible minimum. As a matter of fact, however, in the case of actual non-loaded circuits, the permissible minimum for the insulation is rather low if it is uniformly distributed, and not much trouble in practice is encountered in securing a satisfactory value, especially as it is only in cases where insulators become soiled or where the lines come in contact with foliage that the insulation falls, even under the worst weather conditions, to a seriously low value.

Considering the matter of noise and crosstalk, however, the electrical requirements are that the two conductors should themselves be electrically similar and similarly located electrically with reference to all other wires and the earth. By the two wires being electrically similar it is meant that they should be of the same size and of the same material, and that neither wire should contain high resistance joints. By stating that the wires should be similarly located electrically with reference to other wires and to the earth, it is to be presumed that, under the usual conditions, the wires have been balanced by transpositions. If, however, one wire has a large leak to earth at a given point, and the other wire is well insulated at this point, the balance secured by transposition is disturbed and the chances are that the line will become noisy or that there will be crosstalk. For this reason leakage to earth through poor insulation which is not the same for the two wires is very likely to cause noise.

The Pole Industry in Canada.

According to statistics issued by the Forestry Branch of the Department of the Interior of Canada the total number of poles purchased in 1910 was 782,841, an increase of 118 per cent. over 1909. The total value of these poles at point of purchase was $1,043,874, and the average price was $1.33, or less by 6 cents than the price per pole in 1909. Steam railways, telephone and telegraph companies used 95 per cent. of these poles, the remaining 5 per cent. being used by electric railways, power and light companies; 97 per cent. of the total consumption were cedar poles. At present, says *The Railway and Marine World*, none of these poles are treated or preserved by any method, in which respect Canada is far behind the United States, the latter country using in 1909, 3,738,740 poles at an average cost of $1.89, or at 50 cents more per pole than in Canada. It was found that it paid to use preservative methods. During the last three years the treatment of poles has advanced rapidly in the United States, so that in 1909 15 per cent. of the total number were treated by creosote or other methods. This is an increase of 67 per cent. over the number treated in 1908. At present the United States has eighty-seven pole-treating plants, while Canada has none. It is to be hoped that this great inequality will soon be done away with, and that pole users in Canada may take up this cheap and rational method of securing greater service from the poles used and thus lessening the drain on the forest.

Handling Copper Wire.

BY WILLIAM FERRIS.

The handling and stringing of copper wire is a work that requires a great deal of care. In the first instance, we will take the pay-out reels, which are furnished for the work, fitted up with stakes and every time the wire is tightened up the least bit we have four kinks, one at each stake, and every kink lessens the strength of the wire to a certain extent. A drum reel, handled carefully, avoids this damage to the wire.

The next thing is the joints. There is not more than one joint in ten made properly. No workman can do work right without the proper tools. As a rule, if a lineman has climbers and an old pair of pliers and connectors of any style he is supposed to be equipped. Every joint he makes in copper wire with faulty connectors is practically ruined. There are very few connectors made reversible that fit a No. 12 sleeve as they ought, and I have failed to see the connector for No. 8 wire that fits the sleeve perfectly. Without a perfect fit the joint cannot be twisted as is necessary, three and a half turns, without injury to the sleeve. Even the connector of the best make does not seem to fill the bill the way a good connecting wrench does, for the workman can put the wrench on the sleeve and make his turns with ease. The connectors slip and scrape the sleeve and finally split it at the end. This practically ruins it.

If connectors are copper lined it at least helps save the sleeve.

The lineman makes his error by putting the wire through the sleeve, turning it back, and clipping it before making the twist. When the wire is twisted these short ends cut a crease at each end of the sleeve and practically kill the strength of the joint. There is a great deal of this work being done, and as an order is out against it, it is the foreman's duty to see that this order is carried out.

Just a word on tieing in wires. In this work we also have another instance of improper tools being used. I claim the pliers should not be used. Some men will use them all right, but more men will not. Each man should be furnished a tie wrench to fit over the end of the wire, and use the entire tie. A man that never saw one before will make a better tie than the average man makes with the pliers, and injure the wire less.

To handle this work, which I believe is as important construction work as the company has, the foreman should be a very careful, sober and competent man, and his men should be selected from the very best linemen. The company should furnish the proper tools and men, and it will be repaid for the effort by the improvement in the work.

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The Military Telegrapher in the Civil War.

PART LIX.

An interesting account of an active telegraph service during the Civil War, showing incidentally the variety of duties the military telegrapher was called upon to perform, is given by Mr. I. D. Maize, of Philadelphia, a well-known old time telegrapher.

Mr. Maize's experience reveals the kind of timber military operators were made of. They were versatile, intelligent and brave, and from all records it is evident that there was nothing that they could not do under stress of circumstances.

"I left Harrisburg, Pa., in August, 1862," writes Mr. Maize, "and was ordered by Colonel J. R. Gilmore to report at Annapolis Junction, where, along with the late Crosby Ryan, we were occupied in running trains by telegraph over the single track between Baltimore and Washington, in transporting a large number of troops into Washington. After being there a week, Colonel Gilmore ordered me to Washington and then sent me down to Kalorama Heights, just below that city, where I was assigned to General Rufus King's brigade. I remained there only a week, when the long roll was sounded one midnight, and we marched to the Chain Bridge, a short distance beyond Georgetown. We encamped there for a few weeks, when another advance was ordered beyond the Chain Bridge into Virginia. There General W. F. (Baldy) Smith was in command and with him were Captain Griffin and Captain Hancock, both in charge of batteries. I was all alone and had very long hours, but, hearing that there was an operator in one of the Vermont regiments, I asked General Smith to detail him, which he did. I found out, however, that he was a Continental operator and of course was no use to me. Another operator, named Fred T. Bickford, was detailed by General Smith to assist me, and a fine one he was. At the time of the general advance of the Army of the Potomac farther into Virginia, the advance was so general that it taxed the authorities at Washington to build lines fast enough, and as the material to build these lines had been sent out I told General Smith that if he would give me a hundred soldiers I would build the line, which he did. The soldiers went to work with a will. We dug the holes, placed the wires on the poles as they lay on the ground and then hoisted them up, and between the hours of 8 a. m. and 5 p. m. we had built five miles of loop in a heavy rainfall all day.

"On arriving at the new camp I found that no place had been provided for the operators. General Smith saw an outhouse close to his headquarters, which were in a magnificent Virginia house of about twenty rooms owned by a man named Smoot. We opened the office in this outhouse and found that it was an immense poultry house. After we got in we found that hundreds of chickens, turkeys, guinea hens and geese were to be our companions. We stretched blankets to protect ourselves and in the morning complained to General Thomas T. Eckert, who at once had Mr. Simon Cameron, secretary of war, issue the celebrated order that all operators were to be taken directly into headquarters. After that operators were made more comfortable. D. Brainard Lathrop was also sent here, thus giving us three men at this point, where others had only two.

"When the Army of the Potomac moved down to Yorktown we were left stranded as those men who had been spending the winter in Washington were sent to the front. But Lathrop was ambitious to be at the front, and he walked all the way to Washington, about twelve miles, and succeeded in getting an assignment. He was afterward killed in battle. There were twenty of us left and General Eckert ordered us to Washington, where we were given other assignments. My lot fell to West Virginia. I was halted at Point of Rocks to help Lounsbury and Lawrence with the rush that occurred after the battle of Winchester which was fought the same day.

"After spending five days there, I went to Clarksburg, W. Va., where the late C. O. Rowe was in charge. There was nothing to do there but wait orders. During my stay there I was living at a house that gave us ham and eggs three times a day, nothing else. We would sit in the office during the day and sing the song:

"There is a boarding house
Not far away,
Where they serve ham and eggs
Three times a day.
Oh how those boarders yell
When they hear that dinner bell.
Oh what the boarders say
Three times a day.

"This, set to the tune of America, afforded us much amusement.

"I was then sent to Gauley Bridge at the head of the Great Kanawha River, where I found William Curtis all alone. The office was required to be kept open day and night, and for the two of us it was quite a task. Curtis asked for help and M. H. Kerner was sent out to be night man. He was there only a few days when the operator at Summerville suddenly left and Kerner was sent there, about 18 miles away. He was there only a few days when he was captured and given an excursion to 'Hotel Libby' at Richmond, most of the way being traveled on a razor back horse. I was at Gauley Bridge about six months when I was taken sick and had to return to my home at Huntingdon, Pa. Shortly after I left the place was cleaned out by the Confederates.

"After arriving home I found operators were so scarce that the company went begging for them, and I went to Pittsburgh for a few weeks, but remained there. Captain T. B. A. David very kindly relieved me, and thus ended my army experience which, to me, was more of a picnic than hardship.

"The only fighting I saw was the battle of Drainesville, fought between a brigade of General McCall's division and an equal number of Confederates. General Hancock, who had been promoted to be Brigadier-General, furnished a horse for me and took me out to see the fight."

Mr. Maize is still in active service in Philadelphia, and, although 62 years of age of the time of the telegraph tournament held in that city in Oc-

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tober, 1903, he distinguished himself on that occasion by capturing the prize in the Old Timers' contest.

The Retirement of Secretary Pope.

Mr. Ralph W. Pope, for the past twenty-six years secretary of the American Institute of Electrical Engineers, New York, resigned his position on August 1. A committee on resolutions made the following highly complimentary report to President D. C. Jackson, on Mr. Pope's services:

"For more than twenty-six years Mr. Ralph Wainwright Pope has faithfully and loyally served the American Institute of Electrical Engineers as secretary and for the twenty-seventh consecutive year he has again been elected to the office of secretary. The board of directors and the membership at large are of the opinion that by his continuous and honorable service he has attained such a position in the regard and affections of the members of the Institute that he is entitled to some relief from the active executive duties of his arduous position. Therefore, to carry out his own expressed wishes his resignation as secretary has been accepted. In accepting his resignation, the board of directors, in order to give expression to its own feeling of gratitude as well as the feeling of the membership at large, and in order to reward such long and distinguished service, has appointed him to the position of Honorary Secretary, in which capacity the Institute may still have the benefit of his long experience in its affairs.

"In thus complying with the natural and just desire of Mr. Pope the board of directors has thought it well to mark this change by this minute expressing its good will and appreciation, and by pointing out that the term of Mr. Pope's service in the Institute covers many of the most important developments in electrical engineering, and that this period has witnessed the growth of the Institute from the humblest beginning to its present flourishing condition.

"At the time when the art of electrical engineering was practiced principally in connection with the telegraph, Mr. Pope was a pioneer, having in the year 1858 mastered the working of the Hughes printing telegraph. In 1861 he had charge of the Morse telegraph office at Great Barrington, Mass., in which town he was born in 1844. In 1862 and 1863 he was in the service of the American Telegraph Company in its New York, New Haven and Providence offices, and in 1865 he was one of that band of telegraph pioneers who went into the wilds of British Columbia to establish an overland telegraph system with Europe by means of Alaska and Siberia. In 1867 he was with the Bankers and Brokers' Telegraph Company until 1872, when he became an inspector with the Gold & Stock Telegraph Company. While with this company he was promoted to the position of deputy superintendent in 1880, at which time the apparatus used by the Gold & Stock Telegraph Company was considered by many as representing the highest development then reached by the electro-mechanical art. While in the service of the Bankers & Brokers' Telegraph Company in 1867 he was also assistant editor of "The Telegrapher." In 1882 he became manager of the Union Electric Manufacturing Company of New York. In 1884 he was associate editor of "The Electrician and Electrical Engineer." In that same year the American Institute of Electrical Engineers was formed. The next year Mr. Pope was elected its secretary, which position he is about to relinquish. In 1890 he founded the electrical magazine, "Electric Power," and in 1891 he became the editor for electrical terms in the Standard Dictionary. In 1893 under direction of council, his quarters as secretary were established in the rooms of the American Institute of Electrical Engineers in the Electrical Building at the Columbian Exposition, and he was appointed on the committee of judges for the Department of Electricity. While at the Exposition in Chicago he personally met more than two-thirds of all of the members of the Institute at that time. Ever since Mr. Pope has kept up his large personal acquaintance among the members, which is of great importance to a headquarters official.

"During the administration of President Stillwell, Mr. Pope visited a majority of the Sections and many of the Branches of the Institute, and made a study of their development and needs. All of these activities have eminently prepared him for the position of Honorary Secretary, giving special attention to the organization and the interest of the sections and branches."

The committee consisted of Messrs. John J. Carty, chief engineer of the American Telephone & Telegraph Company; George A. Hamilton, treasurer of the American Institute of Electrical Engineers, and an old-time telegrapher, and David B. Rushmore of the General Electric Company, Schenectady, N. Y.

Current Indicator for Morse Relays.

BY E. C. DODGE, CHICAGO, ILL.

The article published in TELEGRAPH AND TELEPHONE AGE of August 1, headed "Current Indicator for Morse Relays," by Mr. J. S. Knapp, of Buffalo, N. Y., reminds me of a simple device which I rigged up in a little station on the Erie Railroad many years ago:

Take a common sewing needle, rub it on the magnets of the sounder (with the local circuit closed, of course), then suspend it by a fine silk thread from the cork in a small bottle, and stand the bottle on the relay anywhere back of the armature. When it is desired to know if anyone is using the circuit look at the bottle. The needle will be dancing a jig inside of the bottle if the line is in use. If the needle is quiet there is no danger of "breaking" in on anyone.

Any book on electrical subjects can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York.

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An Old Time Telegraph Line.*

BY W. P. S. HAWK, SUPERINTENDENT, CHICAGO, ILL.

It was a beautiful May morning, and the back platform of the Overland eastbound, was taxed to its full capacity. We had lost one hour's time during the night in crossing Wyoming, and it was evident that the engineer, pulling the solid train of sleepers out of Cheyenne, had orders, or made up his mind to make up the lost time, and was soon covering what seemed easily a mile a minute. In my contented whiffing at a good cigar, although naturally noticeable, the flitting by of the telegraph poles on both sides of the track soon ceased to be of further interest, and my eyes caught sight of an old pole line in the distance which later proved to be a one-wire bracket line of very light poles and one apparently of very little importance, but about like a line I at one time fostered, and it looked so natural, I could not help feeling much sympathy for its frailness and wonder at its future, hoping it might some day grow into a more substantial looking and prosperous property. I was returning over the same route traversed when going West some twenty-three years ago, when a resolution was moved, seconded and adopted to "go West and grow up with the country," and so left home, friends and all "to stick it out." A short stop was made in good old Missouri on the way, doing an "OS" job for a short time, but it was soon found that the commercial end of the telegraph was of much more interest, and was taken up in Montana in the late '80s.

The one-wire system comprising nearly 400 miles, mostly prairie line, was kept in fairly good workable condition, but under many difficulties, and delays of three, four and five days were not thought much about at that time. The country was full of cattle. They found considerable relief in fly-time during the hot summer months, using the poles as rubbing posts, and for mile after mile the poles showed a worn wide band about three and one-half feet from the ground. To the inquiries of the tenderfoot this was explained as being a "high water-mark," and he was usually puzzled in looking over the vast prairie to figure it out.

In the early days when the pole line belonged to the Government, the officials were much puzzled for a remedy from cattle rubbing, stampeding, etc., breaking the line down and shutting the different garrisons off from outside connections, and the idea was suggested and adopted of going over the line and driving large spikes into four sides of the poles. This soon proved a remedy as far as the cattle were concerned. The spikes being sharp-cornered resulted in much less weight upon the poles, and likewise less breakdowns from that troublesome source. The Government officials were much elated over this solution of the problem and felt that their means of connection with the outside world would henceforth be more substantial and continuous, but the success of the spike idea was short-lived. The officials were not aware of the fact that they were in reality making a trap into which they must and did eventually fall.

The country was inhabited by thousands of buffalo whose hide was very tough and their hair long and in a short time it was discovered that they came from all quarters to enjoy the ecstasy of having their backs scratched by these spikes. They liked the sensation to the limit, but the pressure of their bodies against the poles knocked the line down, and for months afterwards short sections of the line were gathered up over an area of many miles around. Some of the wire became so tightly entangled in the horns of the sturdy pioneers of the plains that it was found a hundred miles north across the Canadian border. Almost a complete new line had to be built, and much heavier poles were shipped from Michigan, and then transported by boat up the Missouri River to the little town of Fort Benton, at the head of navigation. From there they were distributed by freight outfits, in those days made up by means of three or four wagons fastened together and hauled by from twelve to fifteen teams, all controlled by one driver with a jerk line. This line proved sufficiently strong, and aided by the thinning out of the buffalo, it served a good purpose for many years, and was eventually sold by the Government in 1887. It was the start of the first real commercial telegraph competition in the northwest country, the company being known as the "Rocky Mountain Telegraph Company."

A connecting line arrangement with the Canadian Pacific and Postal Telegraph companies was formed that year, the lines having been extended north from Fort Assinnaboine, Mont., across the border by way of what in those days was known as Battle Creek and Fort Walsh to Medicine Hat, on the main line of the Canadian Pacific. The relay office remained at this latter point for a number of years, later being moved to Dunsmore, then to Swift Current and Winnipeg. The old line and connections were the nucleus of what is now as good and substantial property as modern construction can produce. The property was purchased by the writer in 1893, who operated the company as proprietor and general manager until July 1, 1898, when the lines were purchased by the Postal Telegraph-Cable Company.

The company began business in the summer of 1887 when its connections were completed through to the Canadian Pacific, and there are few or no lines nowadays managed as was the old Rocky Mountain Company in the earlier days of its existence.

As manager of the Fort Benton, Mont., office my duties also involved repairs to the line for a distance of 24 miles south to Springs Stage station and 35 miles north to the Coal Banks, a landing for the Missouri River boats. The pole line carried only one wire and when that was out of commission everything was at a standstill. It was

* The Postal Telegraph.

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not an uncommon thing for the writer to hang out the notice: "Office closed account of line down and the operator out on repairs."

In this work not a great deal of real pole climbing with spurs was often necessary. The sandy soil of the prairie was of such a nature that the old or broken-off stub of the pole could with care be removed and a hole with fairly good walls left. The wire was usually repaired and fastened to the insulator from the ground, the pole shouldered and dropped into the hole and tamped, and the job was finished. This was rendered possible by the one-wire and light poles which had become very light from years of bleaching in the dry altitude.

As the train proceeded the old Wyoming line reminded me of the old days of the Rocky Mountain, and as I watched it as we flew by, and the conditions continued to grow worse, I was soon convinced from the long stretches of fallen poles and broken wire, that it was an abandoned telephone line, which had very likely outlived its usefulness. The poles did not extend beyond the next little town. The line, being a single wire grounded system, had evidently met a natural death, and had been buried there, and as I looked up again at the signboard on the depot it read "Pottersfield."

Improvised Repeaters.*

BY C. A. COOK, PORTLAND, ORE.

The writer was called upon to supply, at short notice, single-line repeaters in addition to the regular equipment. There being eight or ten Atkinson half sets at hand, these were adapted for use as full-sets in the manner shown in the accompanying diagram. There was, however, added to each a three-point switch, the lever of this switch being connected to the ground terminal of the transmitter coils. The left disk of the switch was connected to the ground wire which was removed from the ground terminal of the transmitter coils so that when the lever was thrown to that side the set was practically unchanged. The right disk of the switch was connected to the regular local feed wire of say 26 volts.

In the illustration only one half set is shown, the other half being an exact counterpart and connected with it by means of the connecting cord shown at the right of the diagram.

To use any two half-sets thus equipped as one full-set, insert their duplex wedges in a shorted jack as shown, and the two half-sets then will operate together as one full repeater: their main-line single wedges of course being inserted in the lines to be repeatered.

The convenience of this arrangement is manifest inasmuch as the half-set main-line wedges are usually distributed along the different sections of the switchboard, and their duplex wedges grouped in front of the loop-board, where any two may be coupled together in the spare-jack. This jack, it will be seen, serves to connect the face of one duplex wedge to the back of the other, and vice versa, thus placing the transmitter of one set under control of the relay of the other set.

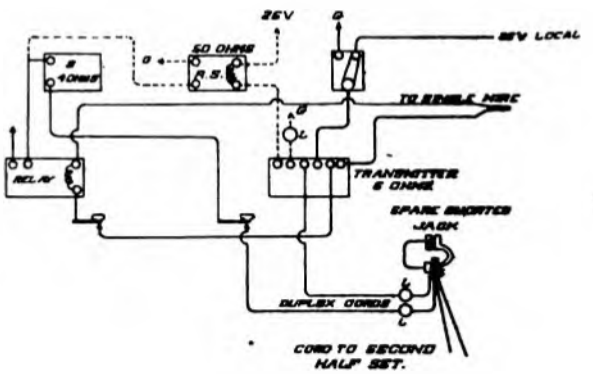

DIAGRAM OF ONE-HALF OF IMPROVED REPEATER.

This makes an excellent, quick-breaking full-repeater, and one that may be relied upon on bad-working wires; and it has given such good results that a number of sets have been similarly equipped. Another point in favor of this arrangement is that its use as a full repeater does not in the least detract from its utility as a half-set.

*Reprinted from last issue on account of omission of cut.

Special Duties of English Messenger Boys.—Awards of special medals for remarkable tasks successfully performed by district messenger boys were made in London recently, when Princess Marie Louise of Schleswig-Holstein presented prizes to about 200 of the boys. Messenger Alfred Beale, it was stated, was sent to Paris to deliver a large box, then to Rome with a dress suit for a high official of the Italian Court, and then to Belgium, where he had to meet the Grand Duke of Mecklenburg at Liege station with a luncheon basket. Another messenger, named Robbins, brought an elephant and its Indian keeper from Brixton to the Palladium and back, and rode on the animal's back on the return journey. A third boy was sent for in hot haste to a house in Bond street, where he found a terrified lady standing on a table. She refused to descend until the lad had captured the mouse which had frightened her. Messenger Cliff was engaged by some irate residents of Kensington to suck a lemon in front of a German band performing in the street. He was threatened by one of the performers, but he kept on sucking. What happened to the band is not stated.

Age Limit Bill Vetoed by Governor Dix.—Governor Dix of New York has vetoed a bill passed by the Legislature 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. The Governor believes the present law fixing the age of 18 as sufficient.

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Selective Telephone Dispatching in the Philippine Islands.

BY L. G. JACKSON, ILOILO, P. I.

In April, 1908, I accepted a position as trainmaster for the Philippine Railway Company and, before leaving the States for the Philippines, I was requested to look over the most successful methods and devices for dispatching trains by telephone. Having lived in Alaska for the preceding three years, my knowledge of selectors was extremely limited and, as far as I was able to learn, but two railroads in the United States were experimenting to any extent with selective telephone equipment. Fortunately, I was advised to call on Mr. G. H. Groce, superintendent of telegraph, and Mr. E. Parsons, assistant superintendent of telegraph of the Illinois Central Railroad at Chicago, who were trying the Sandwich selectors in actual service, and a trip to Kankakee, where the dispatchers were located, convinced me of their adapatibility for such work. My time being limited, I hurried to the Pacific Coast, where I secured a few men for various positions in our work in the Philippines, and sailed from San Francisco on May 26, arriving at Iloilo, Panay Island, on June 28.

The conditions I found on arrival in the Philippines were discouraging. In order to successfully carry on the work undertaken it was necessary to speak Spanish, Visayan (a Filipino dialect) and English and it appeared to me at once that the telephone would serve our purpose far better than the telegraph. An outfit was therefore ordered by cable and I am quite certain it was the first shipment made outside of the States. Upon its installation many predicted absolute failure and on this point the writer was not anxious to argue either way until he had gained more knowledge of its efficiency during the severe weather we are subject to in the Philippines during certain periods of the year.

For six months the service was excellent but after this period the severe lightning began to burn out one part and then another, until I almost gave up hope of preventing their complete destruction. Lightning on this particular island is as severe as any place in the world during the months of March, April and May. After trying many kinds of fuses I failed to overcome the burning out of coils and other parts. I then secured standard telegraph switchboards with a large brass ground plate with 1/32 of an inch air-gap between line and ground plate. This with quarter-ampere fuses eliminated all trouble from lightning and now only an occasional replacing of a fuse is necessary which can be done by anyone employed in an office.

During the severe stormy season lightning often destroys five and six poles in succession, notwithstanding the fact that they are of the best grade of hard wood and every fifth pole provided with a lightning arrester wire. The lightning often burns the wire as if cut by pliers midway between poles. After overcoming the troubles mentioned the selectors rendered excellent service. They are easily maintained and require only occasional minor repairs. I would not advise any one religiously inclined to come to the Philippines to handle telephone work. One is compelled to employ an American lineman, who doubtless came to the Philippines as a soldier, without any vocation. It is necessary to show him every detail from A to Z besides being called upon to straighten out the smallest complication.

The Philippine Islands have now rapidly approached a condition of prosperity. This is especially true of the Island of Panay where 72.3 miles of first class railroad have been constructed, serving a densely populated area and with enough first class sugar land to produce 500,000 tons of that staple each year as well as many other products. On this line of railway concrete and steel have been used in all structural work, on account of the heavy rainfall. All station and trainmen are natives with the exception of three or four Americans, who will soon be replaced by natives.

Salaries of natives are small in comparison with salaries paid in the United States, but this is on account of their limited capacity for high class work, and taking into consideration the cost of their food and clothing, they are as well paid as men in similar positions in the States.

The Telegraph in India.—According to the annual statement issued from the India office the telegraph system under the direct control of the Indian Government consists of 72,420 miles of line, 283,374 miles of wire and 327 miles of cable. A table is given, showing for a period of five years the progress that has been made in extending public telegraphic communication in the Empire. From this it appears that up to the beginning of the year 1905-1906 the capital expenditure amounted to £5,824,031; the miles of line to 61,684, the miles of wire to 227,436, the miles of cable to 245, and the total number of offices open to the public to 5,986. At the end of the year 1909-1910 the corresponding figures were: Capital expenditure, £7,264,674; miles of line, 72,420; miles of wire, 283,374; miles of cable, 327, and telegraph offices, 7,225. The number of messages in the year 1905-1906 was 10,461,117, with gross receipts of £805,748, and net receipts of £206,606, showing a return of 3.33 per cent. on the capital employed. In the year 1909-1910 the messages had increased to 12,084,697, but the gross receipts had fallen to £795,828, which was not sufficient to cover even the working expenses, and there was a charge on Government revenues of £179,646. The gross receipts fell short of those for any year since 1904-1905. Working expenses, on the other hand, continue to increase.

The Telegraph in Chile.—During the year 1910 2,348,000 telegrams were transmitted over the Chilean government telegraph lines, the receipts showing a gain of 22 per cent. over those of the previous year. There are 367 offices.

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Telephone Protector for Outdoor Service.

The type of open space cutout illustrated herewith is in extensive use throughout the country on telephone lines, both in railroad and commercial service, and is manufactured by the Western Electric Company.

This protector is made in two forms—one with a tin cover and the other with a cast-iron cover,

FIG. 1.—PROTECTOR WITH TIN COVER.

which are chained to the framework of the protector mounting, so that they cannot be lost.

The protector itself is mounted on a porcelain base through the bottom of which the leading-in wires are brought in, and consists of heavy carbon blocks as shown in Fig. 2. The spacing between these blocks regulates the voltage at which

FIG. 2.—VIEW OF CARBON BLOCKS.

the protector operates. Under normal conditions, this is adjusted to discharge at 1,000 volts.

The shape of the carbon blocks gives a variable gap between the ground block and the two blocks connected to the line wire. The protectors are arranged so that carbon dust carried across by the discharge will not clog the spark gap, but will automatically drop to the bottom of the protector.

Moisture-Proof Dry Battery for Railway Work.

There are over sixty thousand telephones in use on the various steam and electric railroads of the country, in addition to thousands of miles of signal circuits, therefore, the selection of a proper dry battery is of much importance. A cell for railway work must have, in addition to long life, high efficiency, great recuperative power and high voltage, and should not be affected by moisture. For outdoor work where the dry cells are often not very well protected from snow and rain it sometimes happens that the cardboard cartons of the dry cells absorb so much moisture that when the cells are placed side by side, or on a metallic base, they become short circuited. This causes them to run down and deteriorate rapidly, thus necessitating frequent renewals and an attendant maintenance expense.

The Western Electric Company, realizing this, has recently put on the market for use in railway work a new dry battery. This new cell differs from the company's standard cell in that the cardboard carton has been treated with a special impregnating compound which effectually prevents moisture from reaching the cell proper. This will give sufficient protection so that the life of the batteries used in outdoor work will be as great as that of the batteries used in any other magneto service under ordinary conditions.

Extension of Telephone Train Dispatching on the Great Northern Railway.

The Great Northern Railway, which has nearly 4,000 miles of track furnished with telephone train dispatching equipment, has just placed an order with the Western Electric Company for thirty-two telephone selectors to equip its Cascade division. The circuit will be divided into two sections. The first will extend from Tye to Everett Junction, Wash., with a branch from Monroe to Tolt, Wash., and another from Pacific Avenue to Delta, Wash. The second section will run from Tye to Leavenworth, Wash. The distance covered by the first section will be 93 miles, while that covered by the second will be 36 miles.

Large Storage Battery Plants.—What is said will be the largest emergency storage battery in the world is being installed by the Consolidated Gas, Electric Light and Power Company of Baltimore, Md. Its total weight when ready for use will be approximately 1,079,200 pounds, and it will have an output of 5,517 kilowatts or 7,395 horsepower. This great output will be sufficient to light 220,680 twenty-five watt tungsten lamps for twenty minutes. Very large storage battery plants are also maintained by the electric light companies in other cities for emergency purposes, thus insuring continuity of service. In these plants the chloride accumulator and the "Exide" battery, are used. They are manufactured by the Electric Storage Battery Company of Philadelphia.

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The Turner Monument Fund.

Mr. Charles Keck, of New York, the well-known sculptor, is busily engaged on the design of the monument to be erected at Harriman, N. Y., to commemorate the sending of the first telegraph train order in the Fall of 1851. The success of this worthy movement has been made certain through the generosity of Mrs. E. H. Harriman, of Arden, N. Y., who has agreed to defray the expense of the stone and its cutting, and with this assurance the committee having the matter in charge is making its plans to hold the exercises this fall. Mr. C. T. Ford, of Central Valley, N. Y., Mrs. Harriman's superintendent, is co-operating enthusiastically with the committee as that lady's representative, and is lending valuable aid in the work.

A history of the project is outlined in the correspondence between chairman E. P. Griffith of the Monument Fund and Mrs. Harriman which was published in our issue for July 1. From this it will be seen that the success of the movement is assured, but there is yet an opportunity for those to subscribe who have not already done so, and the sooner they send their contributions to the treasurer the easier it will be for all concerned in the work.

G. B. Prescott's book entitled "Theory and Practice of the Electric Telegraph," published in 1860, contains an interesting reference to the Erie Railroad Company's telegraph plant in the year 1855. "They use the Morse apparatus," says Mr. Prescott, who was the leading telegraph authority at that time,—"in the main circuit the Grove battery, and for locals Daniel's improved zinc and copper. * * *

"In concluding this description of the use of the telegraph upon one of the best managed roads in this country, we will say, what strict justice requires, that to Charles Minot, Esq., is due the credit of its inception and completion, in the face of great opposition on the part of other officers of the road, the accomplishment of which has been of inestimable benefit to both the railroad and the public generally."

Mr. John C. Haring, of Piermont, N. Y., sends some further reminiscences (see page 269, April 1 issue) of his experiences on the Erie Railroad in the early days when Charles Minot was general superintendent. He recently called on one of the oldest engineers of the Erie Railroad, Mr. Garry Iseman, who is now 88 years of age but hale and hearty. Mr. Iseman lives in Piermont and while Mr. Haring was talking with him he was spreading hay on his farm. Mr. Iseman, Mr. Haring goes on to say, was the engineer of the mail train waiting at Suffern station for a delayed east-bound train to pass. When the orders came by telegraph from general superintendent Minot and division superintendent J. J. Lawrence to run to Turner the trainmen were greatly surprised, but having confidence in their superiors they obeyed the order and proceeded. Mr. Iseman told his fireman, however, that he would "creep" around the sharp curves, with a keen lookout, and advised that he be ready to jump in case the other train should heave in sight. But none came and they arrived at Turner without a scratch, amid the cheers of those who had been watching for them.

Mr. Iseman in his younger days took an engine from the Grant Locomotive Works at Paterson, N. J., to the Paris Exposition and was in France three months demonstrating the engine on the government railways. On his return to this country he resumed his position on the Erie Railroad. Mr. Iseman has subscribed one dollar toward the monument fund and Mr. Haring will endeavor to have him present when the celebration takes place.

The Monument Fund Committee consists of E. P. Griffith, superintendent telegraph, Erie Railroad, Jersey City, N. J., chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Old Time Telegraphers' and Historical Association, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York. All remittances should be made to Mr. J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, who has been elected treasurer of the fund. All contributions are acknowledged in the columns of TELEGRAPH AND TELEPHONE AGE, and the funds deposited with the Washington Trust Company, New York, as soon as received.

Contributions received up to date are as follows: Previously acknowledged, $1,645.25; Garry Iseman, Piermont, N. Y., $1.00; Geo. C. Maynard, Washington, D. C., $2.00; J. L. Henritzy, Denver, Col., $5.00. Total, $1,653.25.

Glasgow Exhibition.—The Scottish Exhibition of History, Art and Industry is being held in Glasgow, Scotland. One of the principal buildings is named Kelvin Hall, in honor of the late Lord Kelvin, the inventor of cable and telegraph apparatus, and famous all over the world as a scientist. In Kelvin Hall is exhibited a collection of apparatus and appliances associated with his name and fame. The eastern wing of the building is devoted to engineering exhibits in all its branches. The exhibition will close in October.

A New Mother-in-Law Joke.—A man has sued one of the telegraph companies for $2,000 damages because of the delay of a telegram which prevented him from attending the funeral of his mother-in-law. What does he want? Some men are hard to please.

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Kerite Cables installed upward of 35 years ago, and exposed to deteriorating influences, are giving perfect service to-day.

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The Railroad.

Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railway, Los Angeles, Cal., is seriously ill at the California Hospital in that city.

Mr. M. H. Clapp, division plant superintendent of the Western Union Telegraph Company at Chicago, has been appointed superintendent of telegraph of the Northern Pacific Railway, with headquarters at St. Paul, Minn., vice O. C. Greene retired after an active service of forty-five years.

Mr. E. P. Griffith, of New York, superintendent of telegraph of the Erie Railroad, and Mr. C. H. Bristol, formerly general superintendent of construction of the Western Union Telegraph Company, New York, have returned from an extended trip to Seattle and other Pacific coast points.

The headquarters of Mr. E. C. Keenan, superintendent of telegraph of the Lake Shore and Michigan Southern Railway, are now located in Cleveland, Ohio, having been changed from Toledo where the telegraph headquarters had been located since the formation of that company in 1869.

Mr. Charles Whiting Bradley, acting superintendent of telegraph of the Chesapeake & Ohio Railroad, Richmond, Va., has received the full appointment as superintendent vice J. S. Stevens, resigned on account of ill health. Mr. Bradley was born in Newtown, Conn., in 1836, and began his telegraphic career in 1851 as a messenger on the old Bain line in New Haven, Conn. He was the first telegraph superintendent of the old Atlantic & Great Western Railway, but since 1865 he has been out of the railway telegraph service until January 1 this year, when, on the dissolution of the Western New York Car Demurrage Bureau, he was invited to accept a position with the Chesapeake & Ohio Railway as acting superintendent of telegraph.

English Telegraph Lines Along Railways.—A bill is before the English House of Commons to enable the postmaster-general to carry telegraph wires over railway rights of way without compensation to the railway companies. Three Scotch companies opposed the bill, claiming compensation for the loss of existing rights.

Telephone Train Dispatching.—The Baltimore & Ohio Railroad has ordered of the United States Electric Company, of New York, Gill selector telephone train dispatching outfits complete for forty stations, to be used in the extension of its telephone dispatching circuits from Clarkesburg to Salem, W. Va. A message circuit will parallel the train wire. This installation will complete the train dispatching circuit from Grafton to Salem, and is of interest as a refutation of the report spread about three months ago that the Baltimore & Ohio was to abandon telephone dispatching.

Brady's Civil War Photographs of the Military Telegraph.

The *Review of Reviews* is publishing a fine reproduction of Brady's celebrated photographs of Civil War scenes, one volume of which is devoted solely to the military telegraph, the text in connection with which is from the pen of Major General A. W. Greely, former chief signal officer of the United States Army. General Greely was appointed by President Taft to represent the United States Army at the coronation of George IV. in June last.

Brady's collection shows many telegraphers in the field, singly and in groups, including Colonel William B. Wilson, Colonel R. C. Clowry, William R. Plum, Joseph Schnell, Thomas Morrison and Richard and John E. O'Brien.

General Greely was not connected with the signal corps during the Civil War, and his account was necessarily made up from official reports and other publications. Many of his incidents are taken from the "History of the Military Telegraph," by William R. Plum, and "Lincoln in the Telegraph Office," by David Homer Bates. The account is well written and exceedingly interesting, taken in connection with the large collection of military telegraph scenes.

The following from the Century Company explains itself:

My dear Mr. Bates:—

Please consider that you have our permission to make use of some of your material from "Lincoln in the Telegraph Office" in the book which the *Review of Reviews* is about to publish. It is understood that the enclosed editorial note will be printed giving due credit.

Truly yours,
(Signed) W. W. ELLSWORTH,
Secretary.

(Editorial Note Prefacing General Greely's Account.)

The Editors express their grateful acknowledgment to David Homer Bates, of the United States Military Telegraph Corps, manager of the War Department telegraph office and cipher-operator, 1861-1866, and author of "Lincoln in the Telegraph Office," etc., for valued personal assistance in the preparation of the photographic descriptions, and for many of the incidents described in the following pages, which are recorded in fuller details in his book.

Mr. Robert S. Lanier, who is editing "Brady's Civil War Photographs," is a son of the gifted poet and writer, the late Sidney Lanier.

The employes of the Western Union Telegraph Company, the Northwestern Telephone Exchange Company and the Western Electric Company, of Minneapolis and St. Paul, Minn., held their fifth annual outing recently. The event included a woman's egg race, a fat man's pie-eating contest, woman's tug-of-war, a Marathon moonlight race and an operators' fifty-yard dash.

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Large Reproduction of a Cablegram.

The American Medical Association held its convention in Los Angeles, Cal., recently, and was lavishly entertained. One feature of the programme was a visit to the beautiful Busch gardens in Pasadena. Mr. Adolphus Busch, the owner, was absent in Germany at the time, but sent his greetings to the association by cable. A fac-simile of this cablegram was painted on a large sign by the manager of the gardens and this unique greeting attracted much attention. Mr. C. L. Lewis, district superintendent of the Postal Telegraph-Cable Company at Los Angeles, had a photograph made of it a reproduction of which is presented herewith. It shows the company's regular cable blank in perfect proportion and design.

LARGE REPRODUCTION OF CABLEGRAM OF GREETINGS TO AMERICAN MEDICAL ASSOCIATION.

In the group shown in the picture are readily distinguished the faces of superintendent C. L. Lewis and Mrs. Lewis; manager J. H. Dorsey of Los Angeles, and Mr. F. S. Fell, chief clerk to superintendent Lewis.

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Boat Excursion by Telegraphers in Pittsburg.

Mr. W. J. Dodge, district traffic superintendent, Pittsburg, Pa., is a strong and consistent believer in energy and the company's business will show satisfactory results from his activity. In order to attain the best results he advocates harmony between all classes of employes, and occasional conferences, in order to bring about a live feeling of co-operation and friendly rivalry. In referring to a recent traffic conference in his district, he says: "I have since seen instances convincing me that harmony among all chiefs, which I believe to be one of the first essentials, reigned supreme, and that each was doing his best to make all employes their friends, extending the spirit down the line and endeavoring to inspire keener interest in the service on the part of all."

He, with the co-operation of employes of the various departments hit upon an excellent plan to bring the operators, clerks, and other employes of the company and their families together, as one family, to get better acquainted with one another socially, and thus bring about a more harmonious feeling along business lines. This plan took the form of a river excursion on the evening of July 17. Mr. Dodge, general traffic chief Larimore, and his entire force of supervisors and as many operators as could be spared from duty, together with their respective families, took part in the excursion and a delightful time was enjoyed by every one. In every respect the outing was an unqualified success, and steps have already been taken to have another one soon. The entertainment on board consisted of dancing and euchre playing, and much enthusiasm was displayed by the participants in both forms of pastime. Mrs. T. J. Ferguson, wife of operator Ferguson, won the prize for ladies in the euchre contest, and Mr. J. C. Ford, a broker operator in Pittsburg, captured the men's prize. Light refreshments were served during the trip. The committees in charge were as follows: Chairman W. T. Sims.

Dancing—W. T. Schragen, S. B. Harte, W. C. York, S. H. Ratner, W. B. O'Hara.

Reception—E. R. Tilghman, Miss Anna Schiller.

Euchre—F. L. Wheeler, J. L. Meldon, P. F. Lyons, Miss Mary Martin, Miss Sue Callender.

General chairman—H. Ratner.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

Traffic chief Frank A. Hoag, accompanied by his family, is spending his vacation in Plattsburg, N. Y.

Mr. M. Walton Jones, formerly of Superintendent E. M. Mulford's staff, and at present secretary to the president of the Guayaquil & Quito Railroad, Ecuador, S. A., arrived in this city a few days ago on a two months' leave of absence.

BALTIMORE, WESTERN UNION.

Mr. Samuel T. Shutt, former manager of the Baltimore office, who, on account of ill health, was compelled to resign that position May 1, has returned to Baltimore after a two months' leave of absence entirely restored to health, and is again in service, having been appointed assistant to manager Mr. V. J. Albert, who succeeded Mr. Shutt.

RICHMOND, VA., WESTERN UNION.

J. W. Ware, formerly traffic chief in this office, has gone to the third district as district manager, with headquarters at Jacksonville, Fla. He is succeeded as traffic chief by Mr. C. Keister.

W. N. Reveley, district plant chief, was married on June 14 to Miss Sallie Boyd Cole of Oxford, N. C.

The Electrical Class is being attended with great interest, and much progress is reported. The class is confining itself to a study of the telegraph, it having been decided that this would be more beneficial than a study of electricity in general.

OMAHA, WESTERN UNION.

Mr. Harvey Wolfe, night manager of the American District Telegraph Co., and Miss Mae Curtis, assistant cashier of this company, were married June 27. They spent their honeymoon in Denver and vicinity.

District traffic superintendent J. P. Barnhart has been confined to his home recently with an injury to one of his ankles, received in Wichita, Kan.

Chief operator J. S. Owens lost his mother recently by death at Sedalia, Mo.

Mr. C. M. Trimble, formerly chief operator of this office, has accepted the position as chief clerk to district traffic superintendent J. P. Barnhart.

Mr. Owen A. Wagner, who has been in the hospital for the past three months with blood poisoning, expects to be able to return to work within four or five weeks.

ST. LOUIS, WESTERN UNION.

On the evening of July 26, the officers and members of "The Western Union Electrical Club of St. Louis," accompanied by their families and friends, to the number of about 200, enjoyed a most pleasant outing down the Mississippi River on the steamer Alton. Refreshments were served and dancing, music and social intercourse indulged in to the satisfaction of all. This being the first social function of the Club, it had been looked forward to with unusual interest and anticipation of a good time, and the officers and committees are to be congratulated on the success of their efforts. It is the intention of the Club to give these entertainments at different times in the future that the members may be brought together socially. Among those present were: Mr. W. R. Chapman, district commercial superintendent; Mr. W. J. Armstrong, district traffic superintendent; Mr. C. R. Fisher, district

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plant superintendent; Mr. C. W. Frey, general wire chief; Mr. G. R. Alger, chief operator. The officers of the Club are: Mr. G. R. Alger, president; Mr. G. A. Putnam, vice-president; Mr. A. Turner, secretary and Miss L. M. Hood, treasurer. Committees—Arrangement: Albert Turner, Joseph E. Dunlap, J. F. McCarren. Executive: C. W. Frey, W. J. Armstrong, H. G. Gosting, E. H. Moore, C. W. Crary, J. J. McCruden. Reception: W. J. Armstrong, R. H. Bohle, W. J. Dill, T. F. Dunn, L. M. Hood, C. W. Jost, D. McFarland, C. McNeill, P. A. Peterson, P. W. Robertson, W. L. Rhodes, G. F. Stewart.

Mr. C. W. Groos, has been assigned to the night repeater service.

Mr. B. H. Arter, late of the Telepost Company, is being broken in at the main switchboard.

Chief operator G. R. Alger has just returned from a vacation to Chicago and nearby lake resorts. He was accompanied by his wife.

Miss Alice Coyle, operator on the St. Louis-Detroit circuit, and Mr. Hal. Coffee, Postal operator, were married at St. Charles, on July 29. They expect to make their home in St. Louis after October 1.

Mr. G. A. Riber, quad chief of the Chicago Division, is away on his vacation and Mr. C. A. Clark is filling the vacancy.

Mr. L. N. Boone, assistant wire chief, a veteran employe, is still confined to his bed at the hospital.

Mr. C. C. Dubbs, late of the night repeater force, has been assigned to similar day service.

Prosperity of the Serial Building Loan and Savings Institution.

The fifty-third semi-annual statement of the Serial Building Loan & Savings Institution of New York for the six months ended June 30 shows the Institution to be in a very prosperous condition. In his report to the members, president A. G. Saylor says that "the first half of the year 1911 has been one of the most prosperous in the history of the association, which has already gained more new members in six months of this year than in any full year since that in which the association was organized."

The institution is conducted for the express benefit of the employes of the telegraph and telephone service, and much credit is due to president Saylor and secretary E. F. Howell for the excellent results shown in the report. The board of directors, too, is deserving of great credit for their sound and wholesome advice in the conduct of the association's affairs, and for the giving of several hours of their valuable time each week to the institution's interests.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

New York Telegraphers' Aid Society Statement.

The New York Telegraphers' Aid Society's financial statement for the quarter ended June 6 shows:

Balance on hand March 6		$25,077.16
Receipts		1,933.00
Total		$27,010.16
DISBURSEMENTS.		
Sick benefits	$1,553.87	
Death benefits	500.00	
Expenses	214.86	$2,268.73
Balance on hand June 6		24,741.43
Total		$27,010.16
RELIEF FUND.		
Balance on hand March 6		$5,404.64
Receipts		126.07
Total		$5,530.71
Disbursements		$75.00
Balance on hand June 6		5,455.71
Total		$5,530.71

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.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 17. NEW YORK, SEPTEMBER 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

SPECIAL FEATURES OF THE ATHEARN QUADRUPLEX.

Now that the new Athearn quadruplex is being generally installed in place of the old Western Union standard apparatus, there are several important features in connection with it that multiplex attendants should hasten to become familiar with, in order to avoid possible confusion in some cases and to derive the full benefit of all the additional facilities it offers in other situations.

We will first call particular attention to the alteration made in the local circuits. When the local battery switches are turned in the position required for connecting two different multiplex sets together in order that one may repeat into the other, a lamp resistance of about 100 ohms is simultaneously connected in the receiving side only. This method obviates the necessity for 100-ohm lamp compensating resistance being placed in the repeater cords at the loop-switch where the connections are made. Consequently, when two Athearn sets are to be thus connected, repeater cords must be provided which have no lamps in circuit.

Now during the period occupied in gradually making the numerous alterations in the system the quadruplex department obviously is called upon to handle both the old and the new apparatus, and in case of emergencies, is sometimes compelled to temporarily connect one type with the other. Under these circumstances it is obvious that neither the old nor the new repeater cords will answer the purpose, but the old ones with one lamp removed (the one in the receiving side conductor) will meet the requirement. Hence a third construction of repeater cord should be available until all multiplex sets are uniformly arranged.

Quadruplex attendants, therefore, should be careful when ordering such connections to inform the loopswitch chief what particular construction of repeater cord he shall use. This may easily be done by simply adding the word "new," "old," or "unlike," to his order. Unless a little precaution of this kind is exercised some delay may follow before the sets are properly connected. Otherwise the current will not be even on both sides.

Another special feature of the new quadruplex system is the addition of an extra double set of resistance coils, one for the main and the other for the artificial line, but which have no connection with the rheostat proper. This resistance is designated the "line resistance" and is looped in or out of both the main and the artificial line simultaneously by one movement of a double lever switch. It is needless to state that the value of the resistance in each set of coils thus inserted, or removed is identical, hence the home apparatus will not be thrown out of balance by any alterations made. The distant office, however, will require a new balance and for that reason should invariably be notified before making any change of this kind.

In order to appreciate the value of this addition to the multiplex equipment it is only necessary to call attention to the many relay coils that have formerly been burned out or partially injured on very wet days in the attempt to work quadruplex apparatus as duplexes with the long end closed. The excessive volume of current which resulted not only tended to destroy the insulation of the fine wire coils, but the unnecessary full value of electromotive force contributed to further increase the escape along the line.

The proper remedy under weather conditions of this kind is to provide a suitable voltage for the circuit. This value should obviously be greater than that of the "short end," and less than that of the "long end," hence it has heretofore been found advisable when possible to substitute a duplex set for the quadruplex apparatus temporarily in order to get between the two pressures.

Now the object of the extra resistance coils referred to is to provide a means of regulating the voltage and current to suit the weather conditions without being compelled to change sets or endanger the relay coils, and this is now all ac-

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complished by one simple movement of the "line resistance" switch-lever, which action loops equal values of resistance in both main and artificial line just beyond the relay coils. The home apparatus is thus further protected by being somewhat removed, ohmically speaking, from the external circuit. The insertion of extra resistance in the line also tends to maintain a balance for a much greater length of time than would be possible without it for the reason that the ratio of the permanent, or set resistance, to that of the conductor, or external circuit proper, is thus made much greater. Hence the fluctuations in the value of current in the lesser or line resistance will be correspondingly diminished and therefore less effective.

It would be well for quadruplex attendants to take advantage of this facility whenever the escape on a wire becomes too great to quadruplex and the short end current is too feeble for duplex operation.

(To be continued.)

Recent Telegraph and Telephone Patents.

ISSUED AUGUST 1.

999,367. Call System for Telephone Circuits. To J. J. Garf, Scranton, Pa.

999,505. Composite Telephone and Telegraph System. To O. M. Leich, Genoa, Ill.

ISSUED AUGUST 8.

999,728. Telephone System. To P. B. Allen, Elyria, Ohio.

999,729. Telephone System. To P. B. Allen, Elyria, Ohio.

999,859. Portable Telephone. To N. Pedersen, Genoa, Ill.

999,927. Telephone System. To H. G. Mosler, Chicago, Ill.

1,000,077. Transmission System. To G. C. Cummings, Western Springs, and A. Wray, Chicago, Ill.

1,000,078. System for Transmitting Intelligence. To G. C. Cummings and J. A. Kick, Western Springs, Ill.

1,000,123. Switchboard-Circuit and Exchange Apparatus for Telephone. To H. J. Roberts, Evanston, Ill.

1,000,248. Apparatus for Shortening Electric Waves. To C. Ferrari and M. Pizzuti, Naples, Italy.

1,000,314. Telegraphic Instrument. To J. A. Zundel, New York.

1,000,342. Telephone System and Signaling Apparatus. To F. R. Parker, Chicago, Ill.

Mr. C. B. Turpin, manager of the Western Union Telegraph Company, Fresno, Cal., writes: "I like to get the AGE and the only regret I have in reading it is running across the back cover too soon, in each issue."

Personal.

Mr. William Marconi is now in Glace Bay, N. S., installing the duplex system of transatlantic wireless telegraphy.

Mr. S. Z. de Ferranti, a well-known English pioneer electrical engineer has arrived in New York and will spend about three weeks in this country.

Mr. William J. Smith, of the Western Union Telegraph Company, Seattle, Wash., was married to Miss Therese Schayer of Brooklyn, N. Y., August 28.

Lieutenant W. M. Lambdin, a well-known Texas telegraph operator, for many years in the government military service, has been appointed by President Taft to be Military Attaché to the Spanish legation at Madrid, Spain.

Mr. J. P. Spanier, representative of the Western Union Telegraph Company for Southern Europe, with headquarters at Naples, Italy, has been visiting London, England, for the past few weeks. He was accompanied by his wife.

Mr. T. Buckley, chief electrician Post and Telegraph Department, Wellington, New Zealand, having almost completed his investigations of the telegraph and telephone methods employed in the United States, will sail for London about September 15. He will make similar investigations in England and Europe, and return home in December.

Mr. Walter P. Phillips, a well-known old-time telegrapher and former general manager of the United Press and Associated Press was a recent New York visitor. Mr. Phillips is now connected with the Columbia Phonograph Company, Bridgeport, Conn.

Mr. J. H. Bell of the engineering department of the British post office, London, England, has been engaged by the Western Electric Company for service in New York. Mr. Bell was regarded as one of the brightest telegraph engineers in the service in England.

Mr. J. W. Laughlin of the United Fruit Company's electrical department, Port Limon, Costa Rica, is in New York visiting friends. Mr. Laughlin was formerly employed by C. G. Gates & Co., bankers and brokers in New York, and is well known to the telegraph fraternity.

Mr. A. S. Hibbard, of the personal staff of Mr. Theo. N. Vail, president of the American Telephone & Telegraph Company and of the Western Union Telegraph Company, has returned from a trip to England, where he spent several weeks investigating the telephone and telegraph situation in that country.

Mr. P. J. Feeney, a well-known telegrapher and for the past fourteen years manager in Bangor, Me., of the Vacuum Oil Company, has resigned to accept a position in the Boston office of the Griffin Wheel Company of Chicago. Mr. Feeney is held in high esteem in Bangor where he was

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one of the most respected citizens, and has a host of friends.

Mr. J. Frank Howell, a former telegrapher, and now a successful stock broker in New York, publishes a weekly review of the financial market, besides other financial information. In the issue of August 26 he gives a short and interesting account of the career of Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company. A portrait of Mr. Vail is also shown.

Mr. Edwin M. Kerr, president of the Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa., was formerly a telegraph operator on the Kansas Pacific Railway. He was born May 3, 1860, and in 1881 he entered the Sheffield Scientific School of Yale and graduated in 1884. Mr. Kerr occupied various railroad positions after his graduation and became associated with the Westinghouse interests in 1898. In 1905 he was elected first vice-president of the company of which he now is the head.

Mr. Gano Dunn, a former telegrapher, who for some years has been first vice-president, chief engineer and a director of the Crocker-Wheeler Company, Ampere, N. J., has resigned from that company in order to accept an important engineering and executive position. Mr. Dunn will sail shortly for Europe to attend, as president of the American Institute of Electrical Engineers, the meeting during the Turin Exposition of the International Electrotechnical Commission, to be held on September 7, 8 and 9, and also the following meeting of the International Electrical Congress.

Mr. Jerry L. Newton, manager of the San Antonio, Tex., office of the Western Union Telegraph Company, has retired from active duties after a continuous service of forty-three years. He was a prominent figure in San Antonio's business interests, and has been closely identified with the growth of that city. When he went there two operators were employed in the office. Now there are forty. Mr. Newton has a poetic vein in his nature and is the author of many poems of considerable merit. His numerous friends wish him peace and happiness in his retirement from the world of activity and many years more of health and life.

Mr. John E. Wilkie, head of the United States Customs agents, is an old operator, and attained his present position of importance through his resourcefulness and achievements in the secret service. He was at one time a reporter for the Chicago *Tribune*, and learned telegraphy while covering night police and fire headquarters news for his paper. He, in conjunction with John P. Barrett, city electrician of Chicago, designed the first police patrol call box signal system used in that city. His work in the secret service brought him to the high regard of government officials at Washington, and his latest reward is his promotion to head the United States Customs agents in addition to his secret service duties.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. C. Adams, second vice-president, New York, has sailed for Paris to join his family who have been traveling in Germany and Austria during the summer.

Mr. Theo. L. Cuyler, Jr., assistant treasurer, New York, has returned to his office after an extended leave of absence, greatly benefited in health.

Mr. E. Kimmey, district superintendent, is taking a few weeks' rest.

Mr. M. M. Davis, electrical engineer, New York, is spending his vacation on Long Island.

Mr. E. S. Butterfield, general agent of the money transfer service of this company, New York, has resigned his position and retired from active service.

Mr. M. Klepper has been appointed manager of the office at 1566 Broadway, New York, vice T. J. McQuillan resigned.

Mr. W. Y. Nolley, manager of the Mackay Telegraph and Cable Company, Dallas, Tex., was a recent executive office visitor. While in New York Mr. Nolley called on many of his old friends. Among other executive office visitors were P. J. Farrell, chief operator at Boston; Charles E. Stump, manager of the Dock street branch office, Philadelphia, Pa.; W. C. Lloyd, manager of the New Orleans, La., office, who was accompanied by Mrs. Lloyd.

Mr. J. S. Greever, manager at Chattanooga, Tenn., is spending his vacation in the North, visiting New York, Atlantic City, Philadelphia, Niagara Falls and Washington.

Mr. Warren S. Hallett has been appointed acting superintendent of supplies of this company, with headquarters at New York, vice W. D. Francis deceased. Mr. Hallett was born in Provincetown, Mass., December 20, 1868. In October, 1895, he entered the supply department of this company in New York, and has been employed in that branch of the service ever since, occupying positions as clerk, storekeeper and chief clerk. He filled the last named position at the time of his appointment as acting superintendent of supplies.

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

Death of W. D. Francis.

Walter D. Francis, superintendent of supplies, Postal Telegraph-Cable Company, New York, died of heart disease August 14 after an illness of several weeks. Deceased was born at Bath Beach, L. I., N. Y., August 26, 1862, and began his telegraphic career in 1879, when he entered the service of the Gold & Stock Telegraph Company as messenger. Later he was connected with other telegraph companies, and during the construction of the Postal company's lines to the Pacific Coast, Mr.

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Francis received and distributed supplies and money in connection with that work. He was a man of quick perception and had a wide knowledge of accounting and was familiar with all the details pertaining to the purchasing and handling of telegraph material and supplies. He had a large capacity for work, and a remarkable memory, and these qualities, coupled with his honesty of character, admirably fitted him for the exacting duties of the position he occupied.

The funeral was held at the late home of the deceased in East Orange, N. J., August 16, and was attended by all of the officials of the company with which he was connected, as well as many of his other telegraph friends. Among those present were: E. J. Nally, C. C. Adams, C. P. Bruch, Geo. Clapperton, W. T. Capen, E. B. Pillsbury, L. Lemon, C. A. Lane, Edward Reynolds, John O. Stevens, Theo. L. Cuyler, Jr., W. B. Dunn, Isaac Smith, J. F. Skirrow, D. McNichol, F. E. McKiernan, J. H. Flood, E. T. Rice, J. Foley, H. J. McNamee, John Young, E. S. Butterfield, A. Kavanagh, J. Dennis, E. Fisk, W. J. Lehmer, H. Crawford, J. Koenig, Miss F. E. Mayo, Miss L. Cleveland, B. Ley, G. H. Nokes, J. Kale, W. S. Hallett, F. J. Kernan, C. H. Seymour, C. Shirley, J. T. Needham, J. Costelloe, J. F. Ellis, J. J. Cardona, J. B. Taltavall, M. J. O'Leary, Thomas E. Fleming, J. J. Ghegan, H. G. Pierson.

A most touching tribute of respect to the deceased and one that will live long in the memories of those who took part in it, was the forming of two lines composed of his associates and friends in life, headed by vice-president and general manager E. J. Nally and vice-presidents C. C. Adams and C. P. Bruch of the Postal company, and Geo. Clapperton of the Commercial Cable Company. With heads uncovered and with slow and solemn tread, on either side of the hearse containing the mortal remains of their dear departed friend, the mournful procession wended its way from his late home to the railway station. Interment was at Greenwood Cemetery, Brooklyn.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Theo. N. Vail, president of this company, is spending his vacation a few days at a time at his farm at Lyndonville, Vt.

Mr. Newcomb Carlton, vice-president, is absent on his vacation.

Mr. H. C. Worthen, general superintendent, Southern Division, Atlanta, Ga., announces the following rearrangement of district lines in that division: First district to comprise the States of Virginia, North Carolina and South Carolina; second district, the States of Georgia and Alabama; third district, the State of Florida; fourth district, the States of Tennessee, Kentucky and Mississippi.

Mr. R. W. Whitehead, division plant superintendent, Denver, Col., has been transferred to the like position in Chicago, vice M. H. Clapp now superintendent of telegraph Northern Pacific Railroad, St. Paul, Minn.

Mr. W. C. Titley, district plant superintendent, Chicago, Ill., has been advanced to the position of division plant superintendent at Denver, Col., vice R. W. Whitehead.

Mr. C. R. Fisher has been appointed district plant superintendent with headquarters at Denver, Col., vice Mr. J. H. Otey, transferred to the Western Division.

Mr. J. W. Rahde has been appointed division auditor of the Eastern Division with headquarters at New York, vice Mr. J. J. Clunan who is now special agent for the auditor's department.

Mr. C. A. Rhodes has been appointed division auditor of the Pacific Division of this company, with headquarters at San Francisco, Cal. Mr. Rhodes was formerly with the Postal Telegraph-Cable Company in New York.

Mr. Jacob Levin has been appointed special agent for the Southern Division, with headquarters at Atlanta, Ga.

Mr. F. H. Gournoe, special agent of the Gulf Division of this company, at Dallas, Tex., has been appointed manager of the San Antonio, Tex., office, vice J. L. Newton retired.

Mr. Rogers White has been appointed manager at Suffolk, Va., vice W. S. Green transferred to the operating department at Portsmouth, Va.

Mr. E. L. Spooner has been appointed manager at Wilmington, N. C., vice P. G. White resigned.

Mr. G. C. Cauthen has been appointed manager of the Washington, N. C., office, vice W. F. Clark resigned.

Mr. G. W. Phillips, formerly manager of the Postal Telegraph-Cable Company's office at Raleigh, N. C., has been appointed chief operator for this company at the same point.

Mr. C. H. Parsons, wire chief of the Rock Island system, at Goodland, Kan., has accepted the position of repeater chief of the Western Union Telegraph Company at Salt Lake City, Utah.

Mr. R. H. Brooks, of Memphis, Tenn., has accepted the position of late night chief at Little Rock, Ark.

Miss Carrie B. Beall, manager of the Portsmouth, Va., office of the Western Union Telegraph Company, is one of the most expert women operators in the service. She has been connected with the company for over fifteen years, and was at one time employed at Cincinnati. She was manager of the office at Fortress Monroe, Va., for several years and then went to Hot Springs, Va., as manager, afterwards going to Norfolk as operator. She resigned her Norfolk position to become manager at Portsmouth.

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The Telephone.

The district plant office of the American Telephone and Telegraph Company at Philadelphia was transferred to New York September 1.

Mr. G. B. Bush has been appointed assistant general manager of the Pacific Telephone and Telegraph Company, San Francisco, Cal., vice Mr. P. H. Coolidge, who has been appointed general commercial superintendent, succeeding Mr. G. B. Bush.

Double-Loaded Telephone Cable.—A double-loaded telephone cable is to be laid between La Panne, in Belgium, and St. Margaret's Bay, England.

New Telephone Exchange for Spokane.—The Pacific Telephone and Telegraph Company will erect an eight-story steel and brick exchange building in Spokane, Wash.

International Telephony in Europe.—A bill sanctioning the provision of telephonic communication between Milan, Zürich, Basle, Frankfort and Berlin, has been passed by the Italian Parliament. The installation of the line will be a very important undertaking.

New Telephone Headquarters in Chicago.—A twenty-story building is being erected on the corner of Washington and Franklin streets, Chicago, for the new general headquarters for the five Bell telephone companies of the central group. It is expected to have the building ready for occupancy early in the summer of 1912.

In Memory of Telephone Pioneers.—The promoters of the association of "Telephone Pioneers of America," Messrs. Henry W. Pope, Chas. R. Truex and Thomas B. Doolittle, have established a custom of printing memorial sketches of deceased telephone pioneers. Thus far four have been issued: H. M. Watson, Frederick Allen, W. N. Eastabrook and W. D. Sargent.

Examination for Government Telephone Operator.—We have received from the United States Civil Service Commission, Washington, D. C., an announcement that an examination will be held on September 20 at various places throughout the country to secure eligibles for vacancies in the position of telephone switchboard operator in the departmental service at Washington. Application blanks may be secured of the United States Civil Service Commission, Washington, D. C.

The Telephone in Hamburg.—The central battery type of telephone switchboard has been in use in Hamburg, Germany, since July, 1910. An average of 800 lines are connected to each switchboard, and 14,000 more subscribers may be connected with the present equipment. There are now 40,000 telephones in use in the city at the present time, and it is proposed to increase the capacity of the equipment to accommodate 80,000 subscribers. This would be the extreme limit of capacity of the present telephone building.

Bell Telephone News.—The first number of *Bell Telephone News* has just appeared. It is published in Chicago and takes the place of the papers which were published separately by the five western telephone companies recently grouped together as one with Mr. B. E. Sunny, of Chicago, as president. The papers thus absorbed were the Chicago Operating Bulletin, the Wisconsin Telephone News, the Central Union News, the Cleveland Telephone News, and the Michigan State Gazette. Mr. Amory T. Irwin is editor.

New Book on Telephony.

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

Telephone Pioneers of America.

The first meeting of the Telephone Pioneers of America has been called to be held at Boston, Mass., November 2, 3 and 4.

President Theo. N. Vail and Prof. Alexander Graham Bell have signified their intention to be present and it is believed there will be a large attendance from all parts of the country. It was practically the unanimous vote of the pioneers to meet in Boston in view of its being the birthplace of the telephone.

Arrangements as to entertainment and meeting will be forwarded to the members later. Those contemplating attendance are requested to inform Messrs. Henry W. Pope, Charles R. Truex, and Thos. B. Doolittle, 15 Dey Street, New York, as promptly as possible.

The Cable.

Cables Affected by Earth Currents.—Recent earthquakes and terrestial magnetic disturbances caused considerable trouble in the operation of submarine cables

New Cable Between Russia and Sweden.—The Northern Telegraph Company has laid a new cable between Nystad, in Russia, and Grisslehaum, in Sweden. This is the third cable between these points, and is 123 miles in length.

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

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place, having travelled around the world in the meantime. The total distance covered by the message over land lines and submarine cables was 28,613 miles.

The message was handled as a purely commercial dispatch, without any preliminary arrangement for its speedy transmission. The route of the dispatch was from New York to San Francisco over the lines of the Postal Telegraph-Cable Company; San Francisco to Honolulu, Sandwich Islands, Midway Islands and Manila, via the Commercial Pacific Cable Company's lines; Manila to Hongkong, Saigon, Singapore, Madras by the Eastern Extension, Madras to Bombay by the Indian Government land lines, Bombay, Aden, Suez, Port Said, Alexandria, Malta, Gibraltar, Lisbon and the Azores by the Eastern Telegraph Company, and from the Azores to New York via the Commercial Cable Company.

It is stated that this is the fastest time ever achieved by a commercial dispatch around the world. Eleven years ago a dispatch was sent around the world on the occasion of the opening of the Commercial Pacific cable in nine minutes and thirty seconds, but preliminary arrangements were made for quick transit.

Canadian Notes.

Mr. W. J. Camp, electrical engineer Canadian Pacific Railway Telegraphs, Montreal, Que., has returned from his annual inspection trip to the Pacific Coast.

Mr. W. M. Thompson has been appointed manager of the Saskatoon, Sask., office of the same company and manager of the Winnipeg, Man., grain exchange office of the Canadian Pacific Railway Telegraphs.

Radio-Telegraphy.

Mr. A. F. Parkhurst has been appointed inspector for the United Fruit Company's wireless service for the New York, Boston and Philadelphia boats, with headquarters at 17 Battery Place, New York.

United Wireless Telegraph Company.—The receivers of the United Wireless Telegraph Company, New York, have made arrangements to continue the business.

Wireless Examinations. — The examination of wireless ship operators for certificates will be held at the Brooklyn Navy Yard at 10 a. m. Wednesdays hereafter instead of Tuesdays and Thursdays. Mr. W. H. F. Schluter, chief gunner, U. S. Navy, is the officer in charge of the electrical class.

Largest Wireless Station for Canal Celebration.—A feature of the Panama-Pacific Exposition, which will be held in San Francisco in 1915, will be the wireless telegraph station on Telegraph Hill in that city. It is planned to erect the largest station ever built, by means of which the passage of the fleet of battleships through the Panama canal can be continually signaled. The range will be about 4,000 miles.

Wireless in Alaska.—The Navy Department will erect a powerful wireless station on one of the Aleutian Islands, in Alaska, next year. It will have a radius of 1,500 miles at night and about 800 miles during the day. Wireless stations are now being established on Kadiak, Unalaska and St. Paul Islands, Alaska.

State Monopoly of Wireless in France.—Although the hour at mid-day is daily signalled throughout France from the Eiffel tower by wireless telegraphy, a recent decree of the Administration of Posts and Telegraphs forbids French clockmakers to set up receivers to regulate their clocks and watches. The reason for this is that the Administration claims the monopoly of working the system of wireless telegraphy. Much indignation is expressed over this action.

Transatlantic Wireless Telegraphy.—Under an agreement entered into by Marconi's Wireless Telegraph Company, Ltd., the Marconi Wireless Telegraph Company of Canada, Ltd., and the Marconi International Marine Communication Company, Ltd., on the one hand, and the Canadian Government on the other, says the *Marconigraph*, the Marconi companies undertake to transmit general messages between stations on the Atlantic coast of Canada and corresponding stations on the coast of Great Britain and Ireland, at not more than ten cents per word for such messages. Press messages will be transmitted at a shore-to-shore rate not exceeding five cents per word, and messages in connection with weather conditions and forecasts, tide conditions, ice, and reports on aids to navigation, will also be transmitted at that rate. The Montreal and Three Rivers stations pass into the possession of the government for a substantial consideration, and the Marconi companies undertake to maintain and operate the government-owned wireless stations in Newfoundland, Quebec, Nova Scotia and New Brunswick. This contract remains in force for 20 years.

Telegraph and Telephone Papers at Turin Electrical Congress.—The following papers on Telegraphy and Telephony will be read at the International Congress of the Applications of Electricity, to be held at Turin, Italy, September 10 to 17; "Long-distance Wire Telephony," by F. B. Jewett, of the United States; "Wireless Telephony," by Valdemar Poulsen, of Denmark; "Automatic Telephone Exchanges As a Means of Economy and Improvement in Telephonic Communication in Large Cities," by H. Milon, of France; "Research on Secrecy in Wireless Telegraphy," by P. O. Pedersen, of Denmark.

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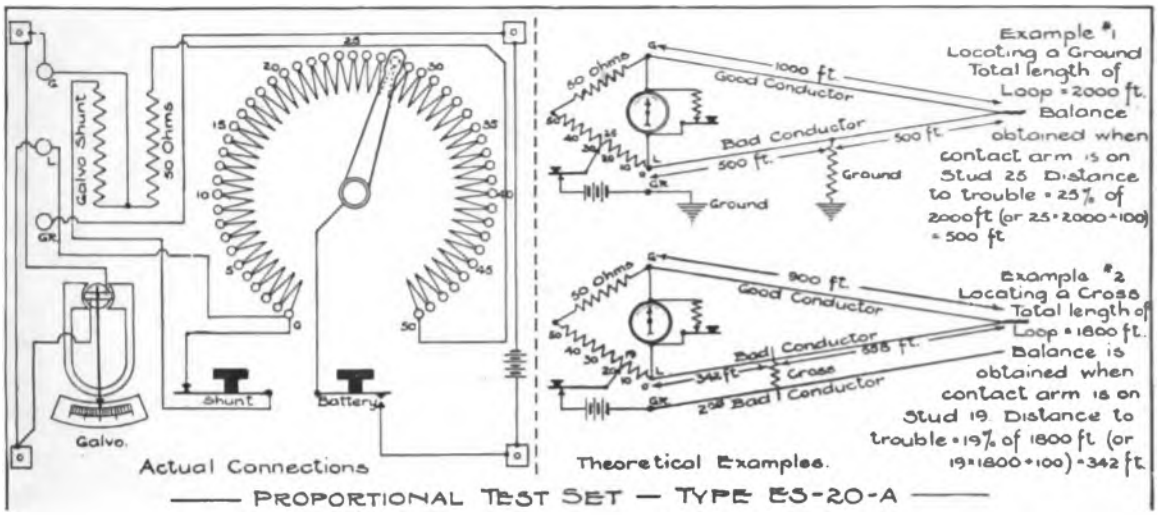
Proportional Test Set.

The accompanying illustration shows the connections of an instrument devised by the engineer of equipment of the Western Union Telegraph Company for locating cable troubles. It is officially designated a Proportional Test Set, and is described in the *Journal of the Telegraph*. It is intended for the use of linemen and others who maintain sections of the company's cables. It consists of a simplified rheostat, galvanometer and battery contained in box 7 in. x 9 in. x 5 in. in size. By its use accurate locations of faults on cable conductors may be readily made.

The diagram at the left shows the relative positions of the component parts of the apparatus and the connections between them, and that on the left shows theoretical examples of tests.



DIAGRAMS OF PROPORTIONAL TEST SET.

The following instructions are given for the locating of a cross or ground:

Select a good conductor of the same gauge as the faulty conductor, preferably one running in the same route and in the same cable. Connect the good conductor to binding post "G" of the test set, and the faulty conductor to binding post "L." Connect the distant ends of the good conductor and the faulty conductor together.

If the trouble is a cross, connect the other crossed conductor to binding post "GR." If the trouble is a ground, connect a ground wire to binding post "GR."

Move the arm over the studs around the circle until a position is found where pressing the battery key does not move the needle. Now press both "Shunt" and "Battery" keys and if the needle moves, find the stud at which the needle has the least movement.

Multiply the number of this stud by the total length in feet of the loop, and divide by 100; this will give the distance in feet from the test set to the trouble. The total length of the loop is the length of the good conductor added to the length of the faulty conductor.

The small lever near binding post "L" is to be used only for centering the galvanometer when necessary before the test is started.

Self-Adjusting Relays and Resonators.

BY C. E. McCLUER, NORFOLK, VA.

Referring to the articles on "Self-Adjusting Relays," by Willis H. Jones, and "Resonators," by J. S. Knapp, in the July 16 issue of TELEGRAPH AND TELEPHONE AGE, some fifteen or twenty years ago I got the "self-adjusting relay" bug in my bonnet, and spent some time studying and experimenting in that direction. My unfortunate and trying experiences with the ordinary railway "hams" during wet weather, had taught me the pressing need for some such device.

My extended experience with the telephone had suggested the possibility of utilizing the principle underlying the operation of the telephone, in lieu of both the telegraph relay and sounder, reducing materially and simultaneously the strength of current necessary to be used on the wires, and the noise of the sounders. I worked for some time on the theory that the susceptibility of the telephone to the influences of even the weakest battery current might be availed of to insure the reception of the Morse signals over heavy "escapes" without interfering in any way with the pulsations of the stronger currents that came over the wire when the circuit was broken at a nearby office. In other words, I thought that perhaps the telephone would make a good telegraph receiver that would on a standard adjustment invariably respond to signals transmitted over either a well insulated or a leaky wire, or to weak or strong currents. The solution of the problem lay, I thought, in the proper adjustment of the dimensions, form and weight of the various elements that go to make up the telephone, but after playing all the variations possible, without achieving success, I finally abandoned the effort

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and settled down into the conviction that the idea was impracticable.

My son, who was aiding me in the experiments, then constructed a "midget" sounder and enclosed it in a light aluminum case to be fitted directly to the ear of the operator after the manner of the telephone operators' head-telephones. It could be as easily worn over the ear as the ordinary head-telephone, and without any more discomfort or fatigue. While the noise of the "midget" sounder could be reduced to any extent desirable, even to the minute noise of a closely adjusted relay armature, its close proximity to the drum of the ear enabled it to be heard clearly and distinctly. The provision of an adjustable tension to the retractible spring which could be manipulated without removing the sounder from the ear, made of it as practicable a telegraph receiver as the ordinary relay, while it was held securely to the ear by the usual head-telephone strap-springs. A few simple tests impressed us with the conviction that the problem I had originally attacked had been pretty well solved, but neither of us being connected with the telegraph interests at the time, we did not have an opportunity for crucial tests, and finally laid the device aside and forgot all about it.

When after about thirty-five years' absence I recently returned to the telegraph key as a means of livelihood, the telegraph equipment of my office consisted of a "main circuit sounder" and a key. In order to get distant offices during wet weather I was compelled to adjust the armature of the sounder closely, which reduced the noise of the armature so that I could not hear it when copying on my typewriter. This naturally caused my mind to revert to the old idea of the "midget" head-sounder. I hunted up the experimental instrument of fifteen or twenty years before, and putting it in commission I was pleased to find that it filled the bill completely, and I have been using it ever since to the entire exclusion of the main circuit sounder.

My idea is that such an instrument might be made to take the place of both the ordinary relay and sounder as a means of receiving telegraphic signals; "call" or "signal" bells being utilized instead for calling offices. On through or busy wires, there would ordinarily be no need for special signaling apparatus, as the operators working such circuits would supposedly be constantly at their keys with the head sounders to their ears. On "way" or railway wires, some means of signaling would be necessary, and bells of various character and tones could be adopted in lieu of the present sounders, probably to the manifest advantage of the service.

Fancy a large telegraph operating room like that of the main New York office of the Western Union Company equipped with a complete outfit of such midget head-sounders. It would be so much easier for an operator to concentrate his thoughts and attention on the minute ticking of his midget head sounder, that I feel quite sure all operators would give their unqualified approval to its introduction, once they had become accustomed to it. Each operator should have his individual "midget" so adjusted as to intensity of sound as to suit his individual requirements or fancy, and with a double flexible cord and plug constantly connected to it, so he could transfer his head receiver from one wire or table to another at will, each table being equipped with a spring-jack for the reception of the receiver plugs, just as telephone operators and their headphones are transferred from one section of switchboard to another.

Annual Meeting of Marconi's Wireless Company.

At the annual meeting of Marconi's Wireless Telegraph Company, held in London, July 20, Mr. William Marconi made an interesting report of progress. He stated that the transatlantic service continues to work very satisfactorily. Some trouble is experienced owing to the mutilation of code words by the land lines, more on the English lines than the American. A satisfactory solution of this trouble would be the continuance of the wireless service into London, provided the necessary license can be obtained from the post office.

He referred to arrangements now being made to introduce the new duplex system of wireless between Clifden station, Ireland, and the Glace Bay, N. S., station.

[Mr. Marconi is now at the latter station in connection with the work.]

The Coltano, Italy, station will be inaugurated this fall and will enable communication to be carried on between Italy and North America, and probably also with Great Britain, Spain, Turkey and Greece.

A press agency has been organized on the high seas, he stated, enabling the company to receive and distribute any news of importance occurring on shipboard or coming within the knowledge of ships upon the ocean.

A dividend at the rate of £7 per cent. per annum on the capital paid up on December 31, 1900, and an interim dividend at the same rate on the capital paid up June 30, 1911, and on the cumulative participating preference shares, was declared, payable September 1.

Making Trouble for Telegraph Companies.—In looking about for ways to make trouble for telegraph companies many curious things are revealed The Hutchison, Kan., *News* says: "It's against the law to shoot off firecrackers inside the city limits. And yet at the telegraph offices every time there is much of a thunder storm, there are firecrackers shot off that would tickle the small boy into ecstasy. They are the fuses on the switchboards, and when they 'blow out' they shoot just as firecrackers would. During the recent electric storm a score of them shot off with loud bangs."

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The Effects of Sunlight on the Transmission of Wireless Signals.*

BY B. L. DOLBEAR AND J. A. PROCTOR.

Since the early days of wireless telegraphy it has been well known that the night is a much more favorable time than day for the reception of signals from stations over 150 miles distant. The difference between day and night intensity is not measurable at 100 miles, but at greater distances the night intensity is often as great as 100 times that of the day. Besides this day-night difference, another interesting phenomenon presents itself, namely, the rapid change of energy received from moment to moment. An inaudible signal will often be multiplied to 100 times audibility within the space of a few seconds; sometimes it remains so for several moments, sometimes for only a few seconds, but eventually disappears as suddenly as it appeared. This phenomenon is called "swinging," and while formerly it was thought to be due somewhat to local conditions at the transmitting station, it is now explained by the constantly changing conditions of the atmosphere, which vary the percentage of atmospheric absorption of the incoming signals. The reason why "swinging" is hardly noticeable at distances under 100 miles may be attributed to the fact that any marked changes in percentage of ionization due to irregularity of the sun's emission probably take place at quite an appreciable altitude. Hence, only the wave-fronts which have traveled some distance (probably corresponding to the minimum distances at which "swinging" is noticed) and which have reached an altitude which includes the ionized portion will be subject to absorption or loss of energy.

Until recently no data have been published showing definite measurements of the relative intensity at different times of day and night. At Amesbury, Mass., in 1909, Mr. Greenleaf W. Pickard carried on a series of measurements on intensity of signals as received from the Marconi transatlantic station at Glace Bay, Cape Breton. This station is about 700 miles from Amesbury, and at the time Mr. Pickard took his readings the radiating wave length was approximately 4,000 meters. A curve representing the results of Mr. Pickard's measurements show that the normal night-time intensity is between thirty and forty times that of the normal daytime intensity.

Last March the authors carried on another series of similar observations of the Glace Bay station signals as received at Revere and Somerville, Mass., each place about four miles from Boston. These observations covered six entire days within a period of two weeks, and on some of the days simultaneous measurements were made at both stations. As the stations at Revere and Somerville are only five miles apart, it would be supposed that the relative energy received at each station would be the same, which proved to be true as curves taken simultaneously check each other very satisfactorily. The most striking feature of these curves however is the effect of sunrise and sunset on the intensity of signals. In the early days of wireless telegraphy Marconi noted a difficulty in communicating over long distances at sunrise and sunset during the experiments in transatlantic communication carried on between the steamship *Philadelphia* and Poldhu, England. Mr. Pickard's curves of 1909 show a slight dip, at these times, especially at sunrise. He found the point of lowest intensity about midway between sunrise time at Glace Bay and sunrise time at Amesbury. It is interesting to note however that the points of minimum intensity shown in Mr. Pickard's curves occur at sunrise at Glace Bay and sunset at Boston.

A slight rise of intensity between noon and mid-afternoon takes place as shown by curves. Corresponding to this between midnight and 2 a.m. there is almost sure to be a sharp rise, followed by a gradual decline, until shortly before sunrise at Glace Bay. Just before taking the plunge preceding, and again at the recovery of intensity after sunrise and sunset, there is usually a quick oscillation of intensity. Besides this single fluctuation there are often others preceding and following it. Another noticeable feature is the relative width of the sunrise and sunset depressions, the latter always being the broader. The minimum points of intensity will generally be found to lag behind the actual sunrise or sunset time by some five minutes. The recovery of intensity after sunrise is perhaps the most surprising feature. In one case this recovery represented the maximum intensity for the whole twenty-four hours.

It seems impossible with the meager data on hand to give a fully satisfactory explanation of these various features. It has been suggested by some that the low daytime intensity is due to ionization of the atmosphere by the sunlight, which causes a dissipation of energy by conduction in the space between the transmitting and receiving stations. This appears to explain in a general way the phenomenon, but when it is considered that only the ultra-violet component of the sunlight produces ionization to any degree, and that these ultra-violet rays penetrate only a short distance into the atmosphere, it becomes evident that only the higher altitudes of the air are ionized, and this should not effect that portion of the wave traveling below this stratum unless it be proved that there is an upward passage of energy to compensate for the conduction losses. Neither does ionization satisfactorily explain the recovery of intensity after sunrise or before sunset. However, this sunrise-sunset effect may be due to entirely different causes and the ionization may be responsible for the effects which take place between sunrise and sunset.

Others have contended that the upper stratum

*From "Electrical World."

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of ionized air may reflect the electromagnetic waves. However, as a definite line or surface of division must exist between substances having different physical properties in order that reflection may take place, this theory does not seem possible. There are no reasons to suppose that such a line exists under the ionized stratum. Fleming has pointed out that there may be a gradual refraction upward of the wave front, which might produce distortion of the wave.

If it were known that there was such a thing as interference between ether waves traveling in the same plane, a possible explanation of the sunrise-sunset effect might be given, but as two rays of light may be made to cross each other at any angle without the slightest displacement or refraction it hardly seems likely that any such action could take place with the electromagnetic waves.

An attempt was made to obtain information regarding possible changes of transmitting conditions at Glace Bay, such as variation of power transmitted at different times of day, but without success up to the time this article was written. The method employed in obtaining these readings is that of shunting the signals in the telephones to an audibility of unity. This is done by connecting a simple resistance box across the telephone terminals and by manipulating the plugs till a value of resistance is found at which the shunted signal is just audible. The greater the incoming energy at the receiving station, the louder the signal, and hence the less the shunt resistance required to reduce it to an audibility of unity. From resistance-audibility curves drawn for the particular telephone used, the value of audibility may be scaled, given a shunt resistance. With a little practice such readings may be confined within 10 per cent error, as shown when checked by galvanometer.

In taking such readings it is, of course, necessary that all inductances, capacities, couplings and adjustments should remain fixed and constant throughout the test. Once adjusted the inductance, capacity and inductive couplings will remain so unless intentionally changed, but the detector is subject to loss of adjustment from strong atmospheric disturbances and sometimes from slight mechanical jars. To retain equal sensitiveness at each adjustment a different method was employed at each station.

At Somerville a low-voltage 60-cycle current was employed in connection with a galvanometer. It is known that the efficiency of a detector of the solid rectifier type, such as is used in radio-telegraphy is independent of the frequency used. When an alternating emf of a few hundredths of a volt is impressed on the detector circuit, and a galvanometer is connected in place of the telephones, a maximum deflection of the galvanometer, obtained by adjusting the detector, indicates maximum efficiency of rectification. The galvanometer and source of supply may then be cut out and the telephones replaced ready for reception of signals.

At Revere a simpler yet very reliable method was used employing a special form of test buzzer with platinum contacts. Across the contacts of the buzzer was connected a condenser of about 0.5 microfarad in series with a single turn of inductance, thereby producing an oscillatory circuit. This loop of wire was placed some four feet from the receiving oscillation transformer, and at such an angle that with the buzzer in operation the oscillations set up in the loop of wire were just audible when the detector was adjusted to its highest point of sensitiveness. It is known that there is a limiting point of sensitiveness to every detector, and it is on this adjustment only that the buzzer is heard. The buzzer should, of course, be carefully muffled in some sound-proof material. The solid rectifier used in these observations was that combination of zincite and bornite known as the "perikon" detector.

The value of resistance corresponding to a given value of audibility depends upon the telephones used—that is, upon their impedance. The current divides at the shunt according to the impedance of the two circuits. The impedance of the telephones used in these tests was approximately 10,000 ohms to the detector currents, while the impedance of the shunt resistance, being non-inductive, is its true resistance. Thus a signal just audible with a 10,000 ohm shunt indicates an actual audibility of two; with a shunt of 5,000 ohms the audibility is three, etc. A curve showing the relation of audibility to resistance offers a means of rapidly ascertaining audibility from shunt readings. A better method is that of constructing a resistance box with a dial switch graduated to read directly in terms of audibility.

Benkö Primary Battery.—Mr. Stephan Benkö, an engineer of Budapest, Hungary, recently invented a new form of primary battery. The battery depends essentially upon the use of a porous carbon electrode in the form of a pot (open at the top) which is surrounded by a closed lead shell. The electrolyte, a bichromate solution, is fed into this shell under a suitable head to give a flow of ½ litre, or more, per hour per cell. It passes through the carbon to the zinc, whence it is removed by an overflow pipe. Polarization is thus reduced to a minimum and remains constant for a given current, provided the cell is not overloaded. The size of cell referred to is 9¼ inches high overall, 6¼ inches long and 1¾ inches wide; it weighs about 10 lbs., excluding the tank for electrolyte, and will give a steady current, depending upon the strength of the electrolyte and rate of flow, up to, say, 25 amperes, at 1.5 volts. The internal resistance is below 0.01 ohm.

Any book on electrical subjects can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - - - *Publisher*
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
R. J. WEEKS, Manager Advertising Department.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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September 1, 1911.

The Combination of Telegraph and Telephone.

That the telegraph and the telephone, as public utilities, are closely related, is generally conceded, and while either one can exist without the other, yet, worked in combination they form a service that is highly advantageous to the public. The telephone, although a more recent invention has a greater popular use than the telegraph simply because it requires no special training to operate it, as does the telegraph; and the fact that it is possible to talk direct with the person one wishes to communicate with is a feature not possessed by the telegraph, where a message is handled by at least two intermediaries. In the public mind, too, more or less mystery is associated with the telegraph, while with the telephone the reverse is true. The people are now beginning to know more about the telegraph through its co-operation with the telephone, and they will certainly use the combined service more and more as they learn the advantages offered by it.

The problem the operating company has to solve is to familiarize the public with the advantages offered by the co-operation of the two services and this it is doing in a very satisfactory manner by means of active canvassing and advertising, and it is gratifying to know that the public is showing its appreciation of the advantages of the combined service by utilizing it with growing freedom.

The technical and mechanical aspects of the problem of combining the telegraph and telephone are of a unique character, but they are being met by true engineering skill, and are being worked out on the assumption that what is thinkable within reason is possible of execution. The thing to do is to find out how, and there is where engineering skill enters the problem. The telegraph is operated most economically by the use of a single wire grounded at both ends, while the telephone requires two wires for satisfactory service. As far as the physical advantages resulting from the combination of the telephone with the telegraph are concerned the telegraph seems to be the gainer. One of these advantages is the interchange of wires; the telegraph calls upon the telephone for wires and vice versa, as necessity arises. The advantages the telegraph has over the telephone in such exchange of circuits is that the telegraph has a great many iron wires which are of no practical utility for telephone purposes, while all the telephone wires are of copper. It is, of course, not to be inferred from this that the telegraph has no copper lines. As a matter of fact it has a great many of them and uses nothing but copper in new work, therefore, these are interchangeable for telephone purposes in case of necessity.

This interchangeability of lines gives both of the companies a great advantage and places each in a position where any abnormal rush of business can be handled promptly, because each can call upon the other for the use of extra wires in the event of shortage in its own facilities.

The co-operation of the telegraph and the telephone seems to offer a solution of the problem that has always vexed the telegraph companies—that of maintaining non-paying offices. There are many instances where telegraph offices are kept open at a loss for the accommodation of the public. Obviously a distinct advantage would be gained by the operating company and the public alike, by closing the unprofitable telegraph offices and sending the telegraph business by telephone to the nearest telegraph office. Indeed this has already been done in some localities and it is stated is giving general satisfaction.

The ultimate success of the combination of the telegraph and the telephone as a public utility depends largely upon the education of the people to the advantages of this service. The telephone is almost as much of a household necessity as is sugar, and a great part of the public is as familiar with it as it is with any other article of household necessity. The popularity of the telephone is no doubt due almost entirely to the systematic business campaign of the telephone companies whose agents go into the homes of the people and explain the great advantages resulting from having an instrument on the premises.

The telegraph of itself, of course, could not be made popular in the same sense because it requires training to operate it, but by means of a telephone its utility can be and is being immensely increased. The combination produces possibilities of great practical value. Every connected telephone is virtually a telegraph office, and if a person on a farm for instance, several miles from a telegraph office, wishes to send a telegram to, say, San Francisco or even London or China, he

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need not hitch up to drive to the telegraph office. All that is required of him is to telephone his message from his home to the nearest telegraph office and the telegraph company will do the rest. This all seems very simple now to those who understand the process, but there are thousands of persons throughout the country who as yet know nothing of this great practical public service utility available and it is the object of the telegraph companies to reach as many of these persons as possible by the publicity campaign that it is now conducting. It is simply a question of education and that success will be the outcome there can be no reasonable doubt.

Old Timers at Atlantic City.

The reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, which is to be held at Atlantic City, N. J., September 5, 6 and 7, promises to be the most successful ever held by the two organizations. A large attendance is looked for and several distinguished gentlemen have been invited to be present.

Atlantic City seems to be the nation's choice as a convention and holiday city. Many of the large associations meet here regularly every year, and the attractions of the resort are so luring that many other bodies give the place the preference for their meetings. The sea air which one breathes is invigorating and the crowds of pleasure seekers give Atlantic City a charm that is hard to resist.

Lessons in Failures.

An important lesson may be learned from some of the results of the examinations of wireless ship operators at the Brooklyn Navy Yard. Under the new law, which took effect July 1, among other things, operators must know how to manage wireless apparatus under extraordinary circumstances. In case of a breakdown, for instance, they must know how to make repairs and put the apparatus in an operative condition. The ability to do this requires a slight technical knowledge, yet some aspirants to positions as wireless operators on ships seem to have the idea that all that is required of them is to be an operator. The question as to who else on a ship could be called upon to restore the apparatus to workable order in the event of breakdown does not seem to have entered their minds, yet this is the crucial test of the examinations.

Those applicants rejected at the examination failed because they were not familiar with the apparatus, and yet it is gratifying to note that of the total number of applicants for certificates the percentage of failures was small. The lesson in these failures is that all wireless, land, or cable operators should increase their knowledge of the work they are engaged in and fit themselves for extraordinary duties and emergencies.

Substitute for Platinum. — It is stated that a manufacturing jeweler of Elizabeth, N. J., has invented and patented a platinum alloy which he claims can be used as a substitute for pure platinum for many purposes, and costs about 3% of the price of the pure metal.

An Arraignment of Men.—A president of one of the great telephone companies states that women are neater than men, and steadier than men. He has 6,000 women in his employ and says that men as a general thing cannot do telephone switchboard work. They are lazy and impertinent and women are to be preferred, as they are more polite and efficient.

Wireless Officials to Prison.—Col. C. C. Wilson, F. X. Butler and W. W. Tompkins, president, counsel and selling agent respectively of the United Wireless Telegraph Company, New York, were, on August 22, taken to the Federal prison at Atlanta, Ga., where they will serve their terms of imprisonment for using the United States mails to defraud, in connection with the sale of wireless stock. Wilson will serve three years, Butler two years and Tompkins one year.

Dallas, Tex., as a Telegraph Center. — Since the establishment of the headquarters of the new division of the Mackay Telegraph and Cable Company at Dallas, Tex., that city probably becomes the third most important telegraph center in the United States. The executive offices of the Postal Telegraph-Cable Company of Texas are located in that city, while it is the divisional headquarters for the Western Union Telegraph Company and for the Mackay Telegraph and Cable Company, as well as being the executive headquarters for the Southwestern Telegraph and Telephone Company.

The Turner Monument Fund.

Work on the monument which is to be erected at Harriman, N. Y., this fall to commemorate the sending of the first telegraph train order, is going forward, and preparations will soon be made for the ceremonies to be held at the unveiling. Mr. Charles Keck, of New York, the sculptor, is making rapid progress in the cutting work and a very handsome monument will be the result.

There is yet an opportunity to subscribe to the monument fund, and those who have not yet done so are urged to send their contributions as early as possible to the treasurer of the fund, Mr. J. B. Taltavall, 253 Broadway, New York. Acknowledgments are made in the columns of TELEGRAPH AND TELEPHONE AGE.

While the fund is practically closed, this notice is intended for those who wish to be identified with this worthy movement and have their names included among those of the other contributors.

The total amount received up to date is $1,653.25.

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The "73" Ball Team of Portland, Ore.

The accompanying illustration represents the baseball team composed of employes of the commercial department of the Western Union Telegraph Company at Portland, Ore., and said to be one of the fastest amateur teams in that State. They call themselves the "73's" and the excellence of their playing has brought them many favorable newspaper notices.

THE "73" BASE BALL TEAM OF PORTLAND, ORE.

The team has visited various cities in the State during the present season, and has played an excellent game, the net results being strongly in their favor, and the telegraph people in Portland are proud of the record established by their team.

A Point on Repeater Adjustment.

BY C. L. HIGGINS, CHEYENNE, WYO.

I have often searched for some treatise on the handling of repeating apparatus but always without success, although there are many available books containing diagrams. I will give some facts which I picked up several years ago hoping that the information may be of general benefit.

In case of a "kick" in a set of Milliken, Atkinson, Weiny-Phillips, or any other standard form of repeater, it may be tested out by first opening the key on, say the West side, and slowly tapping the lever of the West relay with the hand. If the "kick" is noticed while doing this observe whether it comes when you close the relay points, or when you open them; if the former, it indicates that the relay on the East side does not magnetize quickly enough to catch the lever of the transmitter when it is released by the holding magnets, repeating sounder, or other contrivance for holding the transmitter closed when the West side is open. The kick may be eliminated by moving the magnets of the relay closer to the armature by means of the yoke adjusting screw. Should the kick appear when the relay lever is released, it indicates that the holding magnets, repeating sounder, or other device used for holding the East line closed, does not operate quickly enough to perform its functions when the West side is opened. The kick may then be eliminated by tightening the spring, or raising the armature of the repeating sounder, in case of the Atkinson apparatus; moving the holding-magnet a little closer to the armature in the case of the Weiny-Phillips; either tightening the spring to the holding magnets or moving the holding-magnets away from the armature in case of the Milliken or other repeaters, whichever will cause the holding device to act more quickly. By far the greater number of troubles will be found to be due to the causes which produce the kick on closing the relay.

If there is no kick when tapping or writing on the West side reverse the operation opening the East key and tapping slowly on the East relay, making any of the mentioned changes on the West side of the set.

Much of the trouble in the handling of re-

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peaters by inexperienced operators and beginners would be avoided if they would bear in mind that nine-tenths of the trouble with repeaters, after they are once in working order, is caused by weather conditions. These should be met merely by the use of the yoke adjusting screws, moving the relay magnets backward or forward as the case may require; whereas the changing of other adjustments will not only not help the trouble, but is likely to throw the entire apparatus out of adjustment and render it useless.

I might add that all relays should be adjusted by means of the yoke screw, which moves the magnets back and forth. The tensile spring should never be used except in cases of emergency, and then only by an experienced person.

QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph. Having completely covered Mr. Jones' book we are now covering "The Quadruplex," by Maver and Davis, and will bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER VIII (*Continued*).

If ten wires of the same resistance and gauge are connected to one battery, in what proportion will the current distribute itself between the wires?

State the law relating to the distribution of current between several conductors joined to one source of supply.

If one circuit is divided into two branches of twelve ohms and six ohms, what proportion of the current will each branch take and what will be the joint resistance?

Why does the circuit of six ohms take more current than the one of twelve ohms?

Is the total resistance of two routes different to the resistance of either one of them? If so, state the reasons therefor.

What is the name given to express the total resistance of two or more lines joined together and receiving current from the same source?

What is the rule for calculating joint resistance?

[This rule should be studied carefully and memorized, as it is an important one.]

How is the strength of the current in a circuit ascertained?

State Ohm's law. [This law, or rule, should be carefully studied and memorized as it is of great importance.]

Calculate the joint resistance of two wires having (1) six ohms each, (2) six and twelve ohms, and (3) three and nine ohms.

What is a volt?

What is an ampere?

What is an ohm?

In the position of the transmitter shown in Fig. 34 trace the path of the current from the battery to the line.

How many paths are offered to the current at the point X?

What is the name of the resistance *C* placed between the post of the transmitter and the ground?

What is the effect upon the current from a given battery of increasing the resistance of the circuit through which the current flows?

Why are the transmitter connections not arranged to cut out the added resistance when that instrument is closed and leave it in circuit when the transmitter is open, thus dispensing with the "leak" circuit?

What was the reason for adding the "leak" to quadruplex circuits?

Referring to Fig. 34, how much resistance will a current from the distant station encounter at the home station after passing the point X?

In Fig. 35 what are the conditions met with by the incoming current?

How many routes are offered to an incoming current as shown in Fig. 35?

Is there any difference in the resistance opposed to an incoming current whether the home transmitters are open or closed?

Is there any definite relation between the various resistances shown in Figs. 34 and 35. If so, what is the purpose of preserving this relation?

Does increasing or decreasing the working current vary the proportions of current flowing in the branches of a divided circuit?

(To Be Continued.)

New Books.

Elementary Telegraphy, by H. W. Pendry, New York, is a manual for students and was written especially to meet the requirements of the ordinary grade of the subject as published in the syllabus of the City and Guilds of London Institute. While the work is written from an English standpoint, as far as the practice of telegraphy is concerned, it contains much matter of general interest. The underlying principles of course are the same in any country, but in this instance they are set forth in a very clear manner. The American student of telegraphy will no doubt find this part of the book of special interest, as it explains many things that are not always stated very clearly in other books of like character.

The section devoted to telegraph instruments and practice will be of interest to those who care to look beyond the American shores in matters pertaining to telegraphy. It is well to know how things are done in other countries besides our own, and a study of this section will aid in broadening the mind.

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International Association of Municipal Electricians.

The International Association of Municipal Electricians which will hold its next annual convention in Atlantic City, N. J., September 12-15, is now fifteen years old, having been organized in Brooklyn, N. Y., September 15, 1896, and this is the third time it has met in convention at Atlantic City.

As stated in the constitution, the object of the association "shall be the acquisition of experimental, statistical and scientific knowledge relating to the constitution, equipment and operation of fire and police telegraph, light, heat and power systems, and the diffusion of this knowledge among the members of this Association with the view of improving the service and reducing its cost; and the establishment and maintenance of a spirit of fraternity among its members."

There are two classes of members—active and associate. Active members consist of superintendents of fire and police telegraph systems and other persons having charge of or connected with municipal electrical departments. Associate members consist of manufacturers of and dealers in appliances and apparatus relating to fire and police telegraph systems.

The annual meetings 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 association is a vigorous one and is constantly enlarging its sphere of usefulness, and its third meeting at Atlantic City promises to be one of the most important ever held by the association, both as regards the quality of papers and attendance.

The meeting of this year was originally arranged to be held at St. Paul, Minn., but on account of the sad death of S. W. Manning, superintendent of fire alarm telegraph of St. Paul, and chairman of the executive committee of the association, who was killed by electric shock on July 19, it was decided, in respect to his memory, to hold the convention elsewhere and Atlantic City was decided upon as the place of meeting. A better choice could not have been made, as Atlantic City is easy of access and a pleasant place in which to spend a few days during the warm season.

The following is a list of the places of meeting and the officers of the association since its organization:

1896—Brooklyn, N. Y., Frank C. Mason, president; Morris W. Mead, vice-president; L. Lemon, secretary; Adam Bosch, treasurer.

1897—Nashville, Tenn., W. Y. Ellett, president; William Brophy, vice-president; H. F. Blackwell, Jr., secretary; Adam Bosch, treasurer.

1898—Elmira, N. Y., J. W. Aydon, president; G. F. Macdonald, vice-president; H. F. Blackwell, Jr., secretary; Adam Bosch, treasurer.

1899—Wilmington, Del., William Brophy, president; G. F. Macdonald, vice-president; H. F. Cottrell, secretary; Adam Bosch, treasurer.

1900—Pittsburgh, Pa., M. W. Mead, president; J. F. Zuluff, Burt McAllister and R. E. Moran, vice-presidents; F. P. Foster, secretary; Adam Bosch, treasurer.

1901—Niagara Falls, N. Y., 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., W. H. Thompson, president; Jerry Murphy, A. C. Farrand, W. A. Barnes, C. L. Williams, vice-presidents; F. P. Foster, secretary; Adam Bosch, treasurer.

1903—Atlantic City, N. J., 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., Walter M. Petty, president; J. B. Yeakle, G. H. Holderman, C. E. Diehl and Charles Greenwald, vice-presidents; F. P. Foster, secretary; G. F. Macdonald, treasurer.

1905—Erie, Pa., Jerry Murphy, president; Wm. Crane, H. R. Allensworth, R. Blakey and F. A. Cambridge, vice-presidents; F. P. Foster, secretary; C. E. Diehl, treasurer.

1906—New Haven, Conn., 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., R. A. Smith, president; J. B. Yeakle, R. Blakey, C. F. Gall, Charles S. Downs, vice-presidents; F. P. Foster, secretary; C. E. Diehl, treasurer.

1908—Detroit, Mich., 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., J. B. Yeakle, president; J. S. Craig, A. L. W. Kittridge, A. J. Bell and C. S. McCosker, vice-presidents; F. P. Foster, secretary; C. E. Diehl, treasurer.

1910—Rochester, N. Y., H. C. Bundy, president; J. S. Craig, J. W. Kelly, Jr., J. G. Kraetz and J. Berry, vice-presidents; C. R. George, secretary; C. E. Diehl, treasurer.

The headquarters of the association will be at Young's Hotel, Boardwalk and Tennessee Avenue. The rates for accommodations are: Room, without bath, one person, $1.50 per day; for two persons, $2.50; room with bath for one person, $2.00 per day; for two persons, $3.00.

An excellent programme has been arranged and a most successful convention is looked for. Arrangements are being made to provide ample space for exhibits of electrical apparatus and appliances of interest to municipal electricians.

Mr. John W. Kelly, Jr., chief of the Electrical Bureau, Camden, N. J., is in charge of the arrangements and any further information on the subject may be obtained of him.

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Current Supply for Railway Selective Calling Systems.*

BY W. E. HARKNESS, OF NEW YORK.

Selective calling systems now in general use on railway telephone dispatching and message circuits may be divided into two general classes according to the method of sending out the selecting current which operates the selectors connected to the circuit. These two divisions are:

A. Combinations of current impulses.

B. A series of consecutive current impulses.

The first or combination system consists of sending over the line combinations of current impulses ranging from two to five groups, these groups being separated by predetermined time intervals. The groups of current impulses may consist of from three to ten impulses separated by intervals equal in length to the impulses themselves. The time interval between groups will then be of relatively greater length than that between the impulses forming a group.

For mechanical reasons it is necessary, in some combination call selectors, to precede or follow the calling impulses with a group of clearing-out impulses. This group contains one more impulse than the highest group in the calling combination, in order to restore all the selector mechanisms to normal.

By the combination system of calling, the maximum number of selective combinations is possible with the minimum number of current impulses. Other factors being equal, it is therefore the most economical from the standpoint of current consumption.

The second general division, employing a series of consecutive current impulses to close the signal circuit at the desired station, is limited in the total number of selections, owing to the large number of current impulses required to meet service conditions. In other words, while station No. 5 is selected with five impulses, station No. 20 will require twenty impulses, and station No. 45 a corresponding number of impulses. In service, the selectors of this type have been limited to forty-five or fifty stations, a number which may be sufficient for the present for many circuits, but which will not meet the demand for larger numbers nor permit future extensions of existing circuits.

An effort has been made with selectors using this method of operation to overcome the objection to the number and length of current impulses by decreasing the length of impulses and of the interval between them. This, however, has not been notably successful, for electrical reasons which are evident to those familiar with the telegraph. In some cases attempts are being made to adapt this type of selector to a combination method of calling.

*Abstract of paper read at the Boston Convention of the Association of Railway Telegraph Superintendents, June 24-30.

In the various types of selectors in use, two sources of current supply are employed to operate the bell or signal at the way station:

First: By providing one or more cells of battery at the way station to operate a low resistance bell, and

Second: By using current transmitted over the line wires from the same main battery which provides current for operating the selectors, to operate a high resistance bell at the desired way station.

Where the local battery bell is used, the combination call selector presents a marked advantage over the step-by-step type in total current consumption. With the combination type selector the main battery is not connected to the line during the ringing period, which is a large percentage of the total time of calling, and current is therefor not flowing from this source through all the selectors during this interval, as is the case when step-by-step selectors are used. This difference is due to the fact that with the combination type of selector, the bell contacts are held closed mechanically after being brought together by the selecting impulses, whereas in the step-by-step mechanism the bell contact is kept closed only while the selector coils are energized by the current from the main battery. If, in the mechanism of the step-by-step, this current flow were confined to the one selector at the desired station, the excess flow would not be serious, but as all the selectors on the circuit are taking current during this interval, the difference in current consumption between the two systems is considerable.

When the main line bell is employed, the two systems of selection consume practically the same amount of current for operating the bell during the ringing period. The current consumption to operate the two types of selectors may differ slightly, depending upon the type of combination selector employed.

FACTORS GOVERNING CURRENT CONSUMPTION.

The amount of current in amperes required to operate a selective system depends upon the design and construction of the selectors and the margin of operation determined upon. In practice the normal operating current of the principal selectors used ranges from eight to ten milliamperes, the latter being that customarily used in the preliminary calculations to determine the total voltage of the main battery. The current values mentioned are, however, far in excess of the minimum current at which the selectors will operate; in fact they are from two to two and a half times the minimum operating current.

In addition to the minimum operating current at which a selector will function, the maximum current at which the selector will continue to operate should be borne in mind to insure satisfactory operation of the minimum number of selectors remaining on a line which may be open near the dispatcher's office. The maximum op-

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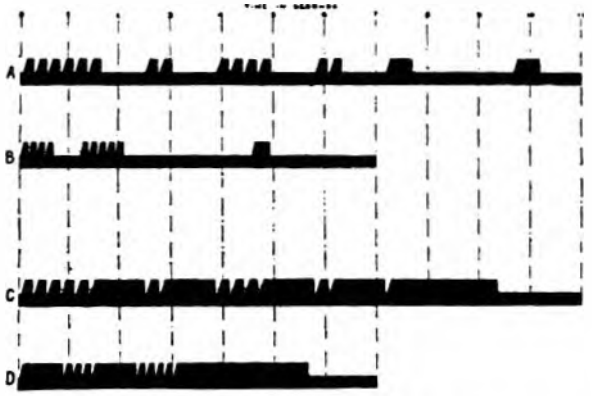
erating current should be at least three times the normal operating current.

In addition to the amount of current in milliamperes, the length of time this current is applied to the line during a call must be considered, as well as the number of calls. The length of time current is on the line depends upon the type of selector used.

The illustration shows graphically the difference in the calling keys required in four types of selectors. These are drawn to scale.

A represents that of a four-figure, eleven-seconds local bell selector key. The combination is



CALLING KEYS FOR FOUR TYPES OF SELECTORS.

2421. The six impulses in the first two seconds are clearing-out impulses. The two wide teeth at the right show the ringing interval.

B represents that of a two-figure, seven-seconds local bell selector key, the combination being 45.

C represents that of a four-figure, eleven-seconds main line bell selector key, with the combination 2421.

D represents that of a two-figure seven-seconds main line bell selector key, combination 45.

The combinations shown contain the average number of impulses per call and as shown, are the same for the local and main line bells of the two types.

When the foregoing are reduced to figures we have the following times during which the main battery is in service during one call.

	Type	Battery closed
A—Local battery bell	4 fig. 11 sec.	2.75 sec.
B—Local battery bell	2 fig. 7 sec.	1.05 sec.
C—Main line bell	4 fig. 11 sec.	7.2875 sec.
D—Main line bell	2 fig. 7 sec.	4.725 sec.

With the foregoing as a basis and various numbers of calls per day, charts have been prepared showing the total ampere-seconds required for the four types mentioned, at different rates of calling for circuits of from 10 to 50 stations. From the information thus shown, the proper ampere-hour capacity of the battery required for any circuit employing the types of selectors described may be determined.

STORAGE BATTERIES.

Storage cells are rated by their ampere-hour capacity, which is governed by the area of the plates in the cells and somewhat by the rate of discharge. The number or size of the plates used may be varied to obtain cells of different ampere-hour capacity. As selective calling systems require a comparatively low capacity and a slow rate of discharge, small cells may readily be used.

In order to provide for emergencies such as interruptions to the power circuit or trouble with the charging apparatus, it is desirable to allow an excess ampere-hour capacity. Provision for at least three days' excess ampere-hour capacity should be made; double this provision is advisable.

In assembling the storage cells into a main battery, various types of construction are employed. The form employing "couples" consisting of a negative and a positive plate with their connecting lugs burned together is the simplest and cheapest and is considered the best for this class of service.

One of the main objections urged against the storage battery has been the maintenance, an objection which seems to be due mainly to the assumption that such batteries cannot be maintained without skilled labor. This objection is believed to be less serious than has been anticipated, for the reason that the average telephone inspector or repair man can, after a little study of the instructions furnished by the manufacturers, care for a storage battery in a satisfactory manner.

CHARGING APPARATUS.

Several methods of charging the storage batteries may be employed, the choice of method to be used depending upon local conditions. They are as follows:

1—Charging direct from direct current lighting circuits, the proper amount of charging current being regulated by means of a rheostat or bank of lamps. This method may be employed only where the voltage of the storage battery is lower than that of the lighting circuit. As the usual selective circuit requires a battery of over 100 volts, this method is seldom used. This method cannot be adopted when alternating current lighting circuits are used.

2—Charging by means of a small direct current generator driven by a direct or alternating current motor operated from the commercial lighting circuits. This is the most flexible and satisfactory arrangement, as the generator may be connected directly to the line in case it is necessary for any reason to cut the battery out.

3—Charging by means of mercury arc or other forms of alternating current rectifiers. This, like scheme 1, is, to a certain extent, limited to charging batteries of a voltage lower than that of the circuit supplying current. The maximum voltage

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at the battery is 115 volts when the rectifier is connected to a 220-volt alternating-current circuit, and 175 volts when connected to a 330-volt alternating-current circuit. This will, in some cases, necessitate splitting the battery into sections for charging, or providing a duplicate set of batteries to be used while the regular set is being charged.

ALTERNATING CURRENT RECTIFIERS.

The type of rectifier which is best known is the mercury arc type. There are, however, some other types which have a lower first cost, but are not capable of transmitting as large currents as the mercury arc type, nor are they as efficient. They have, however, sufficient current capacity for the service under consideration. The principal advantage of the rectifier over the motor-generator set is that it has no moving parts and the set may be operated by inexperienced employes. Its disadvantages are the renewal and breakage of the glass tube in the mercury arc type and the handling and cooling of the liquid, together with the renewal of the electrodes in the liquid types.

COSTS.

The relative costs of the several suitable types are as follows:

Basis of Annual Charge—Depreciation.

Items.	Life.	Salvage.	Depreciation.
Storage batteries	5 years	0	20%
Charging plant	8 years	25%	9.375%
Interest on investment			6%

Maintenance Charge:

Labor—It is estimated that the batteries and charging equipment will require the services of one man one day a week. The rate of pay of such a man being estimated at $3.00 per day equals, per year $156.00

Material—Acid and water for batteries per cell per year ..... .05

Oil, waste, etc., for motor generators, per set per year 3.00

Operating Expense: The power used to operate the motor-generator sets or for charging the batteries direct is based on a rate of 10 cents per kw-hour on the primary of the charging set. The efficiency of transformation is estimated at 70 per cent., which brings the cost of power at the battery terminals to approximately 14.3 cents per kw-hour.

Owing to the possibility of the storage battery receiving less attention in this service than in regular telephone exchange service, and on account of its low rate of discharge, its efficiency in selective calling service is estimated at 50 per cent. of its normal rating. On this basis, the current delivered to the line will cost approximately 28.6 cents per kw-hour, exclusive of the fixed charges.

FIRST COST OF CHARGING EQUIPMENT.

(1) Power panel for charging direct from power circuit. Panel containing low voltage cut-out rheostat, switch and fuses.

Estimated cost	$12.00
Annual charge: Rate.	
Depreciation 9.375%	$1.125
Interest 6%	.72
Total	$1.845

(2) Motor-Generator Sets.

	500 to 600 watts.	250 to 300 watts.
Type of motor, 220 volt direct current	$155.00	$120.00
Single phase alternating current	165.00	135.00
Two phase alternating current	130.00	115.00

(3) Power panels, consisting of slate panel containing switches, fuses, rheostat, starting box and ammeter and voltmeter, $95.00.

ANNUAL CHARGES.

A typical equipment will be considered. The circuit is 150 miles long, constructed with No. 9 B. & S. gauge hard drawn copper. There are thirty four-figure local battery bell selectors used, and the dispatcher is located at the end of the circuit. The number of calls per day is 300.

The main battery in this case will have a voltage of 280. The number of storage cells will be 280 ÷ 2, or 140.

First cost of 140 cells at $.50 each	$ 70.00
Annual Charges:	
Depreciation at 20%	14.00
Interest at 6%	4.20
Maintenance 52 days' work at $3.00 per day	156.00
Acid and water per year at $.05 per cell	7.00
Total annual charges	$181.20

CHARGING CURRENT.

On the basis of charging four hours per week at a 1-ampere rate we have 208 ampere-hours per year, or 58.24 kw-hours which at 28.6 cents per kw-hour equals $16.65.

The charging equipment in this case could be of 200-watt capacity, when the annual charge for this part of the plant would average $36.

The total annual expense would therefore stand as follows:

Charging equipment	$ 36.00
Batteries	181.20
Current	16.65
Total per year for storage battery equipment	$233.86

By using the charging panel and charging direct from the power circuit, this amount could be reduced to about $190.

In comparison with this we have dry cells which would cost as follows:

A 280-volt battery consisting of 215 cells, at 15.5 cents per cell, or $43.40

It is estimated that these cells will have a capacity of 15 amp. hours or 54,000 amp. seconds. At this capacity they would last approximately eight months on this circuit before they would

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have to be renewed. The inspecting and testing of these cells during their life would require approximately one day a month, or a total of twelve days per year at $3.00 per day, or $36. It would also require at least two days to prepare and set up the new cells every eight months, which at the same rate of pay is equivalent to $4 per year.

The total annual expense for the dry battery installation would then be as follows:

215 cells of dry battery every eight months at 15.5 cents	$57.87
Labor, maintaining	36.00
Labor, renewing	4.00
Total, per year for dry battery equipment	$97.87

On the foregoing basis the dry cells would be the more economical, as at least four renewals of the dry batteries could be made per year before the expense would be equal to the annual expense of operating a storage battery equipment.

The preceding figures will be materially changed if we consider the same circuit using four-figure main line bell selectors. The total ampere-seconds required per day will be found in this case to be 671.4 in place of 247.5, as in the corresponding local battery bell equipment. On this basis dry cells of the capacity previously mentioned, i. e., 54,000 ampere-seconds, would last about ninety days, or four renewals per year would be required. The total annual expense for dry cells in this case would be $225.60.

The storage battery equipment would be identical, the only difference in expense being that of current, which would probably be increased. Assuming this item to be doubled the total annual expense for storage batteries would be $246.30.

If, as before assumed, the charging panel is used in place of the motor-generator set, this amount will be reduced to approximately $212.

On this basis it is believed that, although the annual expense for storage battery and motor-generator equipment is slightly above that of the dry cells, the figures are close enough to warrant the use of the storage cells, on account of the more reliable service furnished and the reserve capacity possessed by the storage cells.

Large Wireless Station at Charlestown.—The new wireless station at the Charlestown, Mass., Navy Yard will be among the most powerful in the world, having a maximum range of about 3,200 miles. There will be two aerial poles, each 170 feet high. The old equipment, mostly Stone wireless apparatus, will be supplanted by modern Telefunken sending apparatus, with a Pickard receiver. There will be a 5-kw. Telefunken high-frequency, quench-gap machine, the old sending equipment being a 2-kw. Stone low-tone spark machine. Those in charge of the station will be Mr. J. E. Simpson, chief operator, and Messrs. W. J. Stedman, F. C. Johnson, J. Lucas and J. J. Harrigan operators.

Cardinal Gibbons on Financial Combinations.

In a recent interview Cardinal Gibbons, of Baltimore, expressed his views concerning the combinations of capital for business purposes.

"An important condition in the industrial development of this country," he said, "is the fact that the right of the people to fair and honest treatment by the big business interests is daily becoming more widely recognized by broad-minded and progressive men.

"Laws are being passed and enforced for the proper regulation and control of great corporations, particularly public service companies, and the rights of the people are each year being better guarded and protected. This is as it should be; it creates honesty in business relations, and without honesty there can be no real progress.

"It was said recently by Mr. Theo. N. Vail, the head of the great telephone and telegraph interests, that the public should be considered as virtual partners in all matters that pertain to the common welfare. Therefore, he says, he believes that there should be proper public control and regulation of public service companies. This utterance from a man representing 70,000 stockholders is indicative of the progressive spirit of the times; it shows a broad appreciation of the rights of the people.

"The public has a right to exercise intelligent control over corporations which serve it with necessities. No friend of his race can contemplate without painful emotions heartless monopolies exhibiting a grasping avarice which has dried up every sentiment of sympathy in the public and created a sordid selfishness which is deaf to cries of justice and fair treatment.

"Public control and regulation will prevent such conditions. The healthy combination of human forces in the economic world can accomplish results which could not be effected by any individual efforts. Our industrial progress is so vast that great combinations of capital are now necessary forces in our business life. Many of these corporations have treated the public unfairly, many have been unjustly criticized by the public. There would be greater harmony, more benefits and less ground for complaint if everybody would keep in view the golden maxim of the Gospel, 'Whatsoever you would that men should do unto you, do ye also to them.'

"The people deserve fair and honest treatment and in return they should treat the big business interests justly. Public control and regulation should be such as to assure the people good service at fair prices, and should also protect the investor; it should prevent destructive industrial warfare, for the people in the end pay for such strife; it should end improper political interferance with the rights of the people and with the enforcement of just decisions; it should encourage honest effort to serve the people with the utilities which they require and at the same time furnish proper protection to the men who invest their money in the effort to do so."

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Telephone Cable Transmission.*

BY JOHN B. ADAMS, NEW YORK.

It is my purpose in presenting this paper, to place before telephone men reliable and practical information relating to cable transmission, specifications and manufacture, which, it is hoped, will prove of value to them in solving transmission problems. There has been issued pamphlets and catalogue literature, purporting to treat the question of transmission of telephone currents in cable, along practical lines, but these, unfortunately, contain fundamental statements, which, to any one conversant with the present day principles of the art, are known to be erroneous, and the formula expressing the loss in transmission so misstated as to lead to entirely erroneous conclusions and results.

TRANSMISSION.

The factors which determine the transmission efficiency or talking value of any circuit, are resistance, capacity, inductance and insulation. As applied to a telephone circuit made up of two copper conductors of equal size, insulated with dry paper, twisted together and enclosed in a lead sheath, as a pair of conductors in ordinary telephone cable, it has been found as a result of actual transmission tests and measurements, that the inductance and leakage are so small compared with the resistance and capacity, as to be entirely negligible in their effect on the transmission.

The loss of volume in transmission, or attenuation of the current, as it is called, in a telephone cable circuit, is, therefore, dependent only upon the resistance and capacity, and the loss may be stated as being proportional to the square root of the product obtained by multiplying the resistance of the loop in ohms, by the mutual capacity in farads; i. e. Loss $= K\sqrt{R \times C}$, in which R is the loop resistance, C the mutual capacity and K a constant assumed as equalling the average frequency of the voice currents.

As an example; in the calculation of transmission losses in cable, suppose it is required to find which of the following cables will give the least transmission loss per mile, and also the length of each cable which will give the same loss or the same volume of transmission:

	Cable No. 1	Cable No. 2
Conductors, gauge B. & S....	19	22
Resistance ohms per mile loop	86	172
Mutual electrostatic capacity..	.075	.075

Applying the formula for transmission loss as above stated:

Loss in cable No. 1 $= K\sqrt{86 \times .075} = 2.54\ K.$

Loss in cable No. 2 $= K\sqrt{172 \times .075} = 3.59\ K.$

Therefore, the loss in cable No. 2—22 gauge, is $\frac{3.59}{2.54}$ or 1.41 times as great in cable No. 1—19 gauge, or, with the same capacity, 1.4 miles of No. 19 gauge cable will give the same volume of transmission, i. e. the same talking efficiency, as one mile of No. 22 gauge cable. This result has been confirmed by a large number of transmission tests. With the formula for loss in telephone cable, incorrectly stated as being proportional to the simple product of resistance and capacity (the old "K R Law"), the loss in the No. 22 gauge cable would be twice that for the No. 19 gauge cable, a result which has been proven to be entirely incorrect by actual test.

TRANSMISSION STANDARD

In calculating values of telephone transmission, it will be found convenient to adopt some standard for transmission loss, i. e., some unit of loss in terms of which the losses in any circuit can be expressed. In the absence of any accepted name for such a unit, a standard of this description which has been quite generally adopted by telephone engineers in this country, is a cable having a resistance of 88 ohms per loop mile (44 ohms per conductor mile), and a mutual electrostatic capacity of .06 microfarads per mile, with no inductance and no leakage. This is known as a standard cable and losses expressed in terms of this unit are referred to as losses in miles of standard No. 19 gauge cable, or simply miles of standard cable.

As an example of the use of this standard, in calculating losses, suppose it is required to find the relative talking efficiency of the following circuits:

Gauge	Loop Resistance Per Mile	Mutual Capacity Per Mile
13.....	21.5.....	.07
16.....	42.5.....	.07
19.....	85.0.....	.075

13 gauge $\sqrt{\frac{21.5 \times .07}{88 \times .06}} = .534$ miles standard cable.

16 gauge $\sqrt{\frac{42.5 \times .07}{88 \times .06}} = .75$ miles standard cable.

19 gauge $\sqrt{\frac{85 \times .075}{88 \times .06}} = 1.1$ miles standard cable.

That is, the losses in one mile of the above cables are equivalent to the losses in .534, .75 and 1.1 miles of standard cable.

STANDARD GRADE OF TRANSMISSION.

By a standard grade of transmission is meant the standard of transmission loss, including the loss in switchboard and substation apparatus as well as that in the portion of the circuit between apparatus terminals, commonly called the line, which is considered allowable for any particular class of service. This question of a standard transmission is of increasing importance as toll or long distance lines are extended, and is of the utmost importance that it be carefully considered in the development of new plants or in planning extensions to existing ones.

While economical consideration usually governs this question it should be borne in mind that standards of transmission have been gradually

* Abstract of paper read at Boston Convention of Association of Railway Telegraph Superintendents, June 23-30.

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raised by the leading telephone companies throughout the country in meeting the increasing demands for long distance telephone service, who in so doing have found the additional investment necessary a profitable one from the standpoint of service efficiency. A few years ago a circuit having a loss of 40 miles of standard cable was considered a satisfactory one; today, however, a loss of over 30 miles is not considered satisfactory commercially. In general it may be said that a conversation over a telephone circuit under very favorable conditions cannot be carried on where the transmission loss is greater than the equivalent to 45 miles of standard cable.

STANDARD GAUGES OF CABLES.

The question of the proper gauge of wire in a cable for any particular class of service, or the gauge of cables in general to be used in the telephone plant, is dependent upon local conditions: These conditions are: 1. Grade of transmission considered satisfactory. 2. The ratio of the number of trunks to the number of subscribers' circuits entering a central office. 3. The average length of subscribers' and trunk circuits. 4. The ratio of local to toll business originating in the district or districts under consideration.

The standard wire gauges in use in cable at the present time are, 13, 14, 16, 19, 20 and 22 B. & S., and it is believed that this range of sizes will satisfactorily and economically meet any ordinary requirements which may arise. Sizes outside of this range can, of course, be used, but No. 22 is about as small as is desirable for mechanical reasons, and while conductors larger than No. 13 B. & S. have been used in this country and abroad, with further increase in the transmission efficiency, it is doubtful if the expense of such cable is justifiable except in special cases. In general the classes of service for which the different gauges are used are as follows:

Subscribers' loops.....Nos. 22, 20, 19, B. & S.
Local Trunks.....No. 19. "
Toll Board Trunks....Nos. 16, 14, 13, "
Toll lines in cables....Nos. 16, 14, 13, 12 and 10.

It is often found economical to use a combination of these conductors in the same cable, as, for instance, 50 pairs of No. 16 gauge with 50 pairs of No. 19 gauge; this is known as composite or combination cable. A cable of this class can be used economically where subscribers and high efficiency trunks are required along the same route, the economy being effected in the saving of lead in the cable sheath.

INSULATION.

Dry air is the ideal dielectric between conductors for telephone transmission, but, inasmuch as the conductors in cable could not be kept permanently separated with an all air dielectric, a separator of one or more paper ribbons is applied spirally to each conductor in such a manner as to include as much air around the conductor as possible, and to separate the wires of a pair as much as possible. The spiral application of the ribbon of paper has been found much superior to laying it around the conductor longitudinally, as it secures a greater amount of air space and a more perfect mechanical separation. Pure Manila rope paper of a suitable thickness, overlapped in applying sufficiently so that each conductor will remain completely covered under extreme conditions of bending, has been found superior to any other material, both electrically and mechanically.

The two wires of a pair with different colored insulation for identification are twisted together, the requisite number of pairs cabled or stranded up concentrically in layers, in reverse directions, and the whole wrapped with heavy paper for keeping the core in shape and for additional protection against the grounding of the conductors in the outer layer, to the sheath. The core is then dried or desiccated either in vacuum or drying ovens at a temperature sufficient to vaporize all hygroscopic moisture in the paper, and when perfectly dry the core is immediately covered with a lead pipe, the ends of which are hermetically sealed.

Cable may be made with single, double or triple wrap paper insulation, according to specifications, the triple wrap being principally used in heavy gauge cables. The choice between single wrap and double wrap paper insulation for the ordinary cable in 19, 20 and 22 gauge is a matter of individual preference. There is probably many times as much cable with single wrap insulation in use in this country as with double wrap, and it will continue to be used exclusively by its adherents for ordinary underground and aerial work. On the other hand, the alleged greater immunity from trouble, by the use of double reverse wrap insulation, especially in the work of splicing up the cable, is thought by many to be worth all of the slight extra cost over that of single wrap. It might be well to state here that this extra cost is in the lead required for a slightly greater diameter of cable. As the insulation resistance is substantially the same in either case, single or double wrap insulation makes no appreciable difference in the transmission efficiency of the cable.

MUTUAL VS. GROUNDED CAPACITY TEST.

There are two general methods of determining the electrostatic capacity of cable for telephone service, the difference between the two being the connecting of the wires under test.

1. GROUNDED TEST, SOMETIMES CALLED REGULAR TEST. This is the older method and consists of measuring the capacity between one wire and all other wires including its mate, grounded to the sheath.

2. MUTUAL TEST. This consists of measuring the capacity between one wire and its mate, all the other wires being grounded to sheath.

Considerable argument has arisen concerning the selection of one of the above tests as the proper one to use, and it has even been hinted that some manufacturers in meeting specifica-

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tions, have used the mutual test which gives a lower capacity than the grounded, when it was understood that the grounded test should apply. The grounded test being the older method, it is always understood that it shall apply unless the mutual test is specified, and this is a general rule followed by all reputable manufacturers.

In dry core telephone cable of the usual construction, the mutual capacity will be less than the grounded capacity, and will vary between the limits of 60 to 75 per cent. of the grounded capacity, depending upon details incident to the manufacture of the cable. The hard-and-fast rule of Mutual = .66 of grounded, as stated by some cable makers, does not hold in practice and cannot be depended on for accurately converting grounded capacity into mutual capacity, or vice-versa.

As the ratio of mutual to grounded capacity is not constant, the question of which should be specified to secure a cable of the required transmission efficiency becomes important. In metallic circuit service, it is believed that, since the mutual rather than the grounded capacity is the constant of the cable directly indicative of its value as a talking current, the mutual is the proper test to apply, and this is now current practice among many of the larger telephone companies in this country and abroad. As there is a material difference between the results of the two tests applied to the same cable, it is, of course, important that the method of testing be specifically stated in specifications, in order to secure a cable of the desired quality of transmission.

The diameter of a cable for a specified capacity will vary with the expertness of the manufacturer. Improvements in the methods of applying the insulation, etc., have resulted in a smaller diameter for a given capacity, or a lower capacity for a given diameter. Therefore, references to the diameter of cable are omitted from specifications as giving no assurance of the desired capacity or transmission value, the results of actual tests only, being depended on.

LEAD SHEATH.

In dry core cable the life of the cable as affected by moisture or mechanical damage, is evidently dependent upon the integrity of its protecting lead sheath. The greatest care is therefore exercised to insure a sheath free from pin holes or other defects. The practice in regard to the thickness and composition of the sheath for telephone cable varies with different purchasers, but as a general guide for Nos. 22, 20 and 19 gauge high capacity cable, recommend minimum thicknesses as follows:

5	to	50	pairs.....	5-64" wall
60	"	100	"	3-32" "
120	"	200	"	7-64" "
200		up	.....	⅛" "

For low capacity cable an additional 1-64" thickness in each case should be used.

I recommend an alloy of lead with a small percentage of tin for all large and soft core cable, and for small cable which may be subject to vibration or swaying by the wind. In large cable especially the addition of a small percentage of the tin in the sheath is a much more economical way of securing additional strength and stiffness than to increase the wall thickness.

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.

Monkey Investigates Telegraph Circuits.—Mr. W. B. Kendall, manager of the Western Union Telegraph Company at Dallas, Tex., has among his records for wire interruptions a trouble ticket that, to say the least, is novel. It reads—"Closed third circuit open in Copleys Jungleland Theater. Monkey took out fuse and turned in signal five times."

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Atlantic City Reunion of Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps.

For the first time in their history the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps will hold their reunion at Atlantic City, N. J. The dates selected are September 5, 6 and 7, and there is no doubt that the members and their families who attend will find in Atlantic City a delightful atmosphere for their meeting. That famous seaside resort, with its celebrated seven-mile boardwalk and its healthful air direct from the Atlantic, is full of life and enjoyment, and a more charming place for the reunion could not have been chosen.

The Atlantic City reunion is the thirtieth held by the twin organizations, and there is every indication that each member who can get away from

COL. W. B. WILSON.
President of Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps.

duty will be present with his family to enjoy the delights of this city by the sea.

This reunion will mark the fiftieth anniversary of the founding of the United States Military Telegraph Corps and the event will be celebrated by appropriate ceremonies.

Following is the official programme of the meetings:

Tuesday, September 5.—10:00 a. m.: Business meeting of the Old Time Telegraphers' and Historical Association called to order at the Marlborough-Blenheim by the retiring president, Mr. W. J. Lloyd, of Chicago. Address of welcome and response. Installation of the new President, Col. W. B. Wilson of Holmesburg, Philadelphia.

Transaction of business, etc.—2:00 p. m.: Roller-chair trip. 7:30 p. m.: Business meeting of the United States Military Telegraph Corps. 8:30 p. m.: Concert and entertainment on Steel Pier.

Wednesday, September 6.—Morning: Ocean sailing. Afternoon: Trolley party to Ocean City. Evening: Concert and theatre entertainment on Million-Dollar Pier.

Thursday, September 7.—Morning: Ocean bathing. Afternoon: Go as you please. Evening: Banquet at the Hotel Shelburne.

The chairmen of the various committees are: Mr. John Wintrup, reception committee Old Time Telegraphers' and Historical Association; Mrs. Frank E. Maize, ladies' reception committee; Mr. G. W. Deetz, Atlantic City, N. J., committee on hotels; Mr. John W. Reed, committee on badges; Mr. C. E. Bagley, committee on banquet.

The reception committee of the United States Military Telegraph Corps is composed as follows: Messrs. Jesse W. Crouse, chairman; Richard Graham, John Wintrup, Isaiah D. Maize, of Philadelphia; Henry H. Atwater, William L. Ives, George M. Huntington, Marion H. Kerner, Frank A. Stumm, Charles W. Pearson, Alfred Winder, Thomas T. Eckert, Jr., David H. Bates, Jr., Verdie J. Knittle, Albert Eckert Chandler, of New York, and Thomas Wallace Wilson, of Atlantic City, N. J.

Mr. G. W. Deetz, manager of the Western Union Telegraph office at Atlantic City, as chairman of the hotel committee, will be pleased to assist the members in arranging for their hotel accommodations. They should give this important matter their earliest attention, however, on account of the crowded condition of the hotels at this season of the year.

It is possible that reduced railroad rates may be in effect from various sections in the country to Atlantic City during the time of the convention, and it would be well for members who intend to be present at the meeting to inquire of their local railroad agent in regard to this.

The convention headquarters will be at the Marlborough-Blenheim, which is one of the leading hotels in Atlantic City.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company, and Mr. E. J. Nally, vice-president and general manager of the Postal Telegraph-Cable Company will probably be present at the reunion, as well as many other prominent telegraph and telephone officials.

At the banquet which will be held at the Hotel Shelburne, on the evening of September 7, Col. W. B. Wilson, the president of the Old Timers, and also president of the Society of the United States Military Telegraph Corps, will act as toastmaster. Among the speakers will be several prominent telegraph and telephone people.

Great interest seems to center in the fact that Mr. Edward Lynn Morse, son of Prof. S. F. B. Morse, inventor of the telegraph, will be present at the Atlantic City reunion of the Old Time Telegraphers' and Historical Association, and the

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Society of the United States Military Telegraph Corps. Mr. Morse states that he anticipates much pleasure from meeting the members of the two telegraph societies at Atlantic City.

He was in the telegraph service for about six months in the winter of 1878-79, when he was a clerk in the office of the late John Van Horne, vice-president of the Western Union Telegraph Company, New York. He soon became convinced, however, that he was not cut out for a business man, and has since then devoted himself to an artistic career, having acquired his father's tastes in that line.

Mr. Morse was born at Poughkeepsie, N. Y., on March 29, 1857, and is the youngest of Prof. Morse's children by his second wife. One of his brothers, William Goodrich Morse, is living in California, and has a daughter, Miss Leila Livingston Morse, who lives in Rochester, N. Y. It will be remembered that she sang at the Carnegie telegraph dinner in New York a few years ago. Mr. Morse's sister, Mrs. Franz Rummel, lives in Washington, but spends most of her time abroad. She has three sons. Mr. E. L. Morse has two children, a son and a daughter.

All of Prof. Morse's children and grandchildren by his first wife are dead, with the exception of one son, James Edwards Finley Morse, who is now a very old man. There are, however, some great grandchildren still living.

Mr. Morse is at present engaged in the task of selecting and putting together his father's letters for publication, and states that he has yet several years' work before him. He has also written an article on his father's work as a painter which will appear shortly in "Scribner's Magazine," and will be illustrated by a number of reproductions of the paintings.

Following is a complete list of the living members of the United States Military Telegraph Corps so far as known:

Abernethy, John T.
Albright, George S.
Allison, George
Anderson, Joseph
Andrews, M. S.
Armes, William J.
Armstrong, Ewing L.
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.
Benedict, C. H.
Benner, Frank
Bliss, Abel H.
Bliss, J. E.
Bohle, R. H.
Boyd, Joseph W.
Boyle, E. C.
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.

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
Cowell, Robert
Cromwell, George E.
Cronin, Daniel
Crouse, Jesse W.
Cruise, J. D.
Culbertson, Cambridge

Darlington, H. P.
Daugherty, Walter
David, Thomas B. A.
Davis, Frank P.
Davis, Samuel
Dealy, William J.
De Bree, Nathan
Dennis, L. B.
Denny, J. C.
Dixon, John R.
Dougal, William H.
Dougherty, C.
Dow, D. D.
Duell, John T.

Eitemiller, George M.
Elliott, R. H.
Evans, Frank H.

Felton, G. C.
Ferris, D. V.
Fitch, Derick H.

Fonda, Ten Eyck H.
Forsey, W. S.
Fowler, J. J.
Freeland, J. W.
Frisbie, M. D.
Fuller, J. A.
Furr, R. A.

Gard, D. H.
Geiger, John M.
Gentry, Rev. W. D.
Gilmore, Col. J. R.
Goalding, George J.
Graham, Richard
Greene, E. C.
Gregg, Harry L.
Griffin, Russell B.
Griffin, S. L.
Griffith, C. H.
Groomes, Isaac C.
Gruss, Charles F.
Gulick, C. W.
Gulliher, James K.
Guthridge, John F.
Hammond, Charles D.
Hancock, A. G.
Hatter, John C.
Hatton, O. C.
Hauxhurst, H. C.
Henderson, George
Henderson, Harvey B.
Hogan, Daniel
Hoge, O. E.
Holmes, George S.
Homan, Charles A.
Holt, Theodore
Hood, Oliver Perry
Hoover, R. B.
Hotchkiss, Z. P.
Howe, G. W.
Hull, A. K. V.
Hull, Henry P.
Huntington, Geo. M.
Huyck, Maynard

Ingram, S. E.
Ives, William L.

Jaques, Charles W.
Johnstone, W. F.
Jones, George E.

Kanode, A. H.
Kennan, Geo.
Kennan, F. W.
Kenny, Edwin
Kerbey, Joseph Orton
Kerner, Marion H.
Kettles, William E.
Kiley, John K.
King, Thomas M.
Knapp, Stewart W.
Knight, Frank B.
Korty, L. H.

Laird, Thomas A.
Lamb, Frank H.
Lemoreaux, C. L.
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.

McCleverty, Joseph D.
McCloskey, I. T.
McClure, J. P.
McCoy, Daniel B.

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McIlvaine, J. F.
McKelvey, A. T.
McKenna, E. W.
McMurtry, B.
Magehan, W. H.
Maize, Isaiah D.
Maloney, Patrick
Martin, Henry S.
Martin, Robert W.
Mason, J. Q.
Matlock, Henry H.
Maynard, George C.
Meagher, James
Mixer, Charles H.
Montanye, C. D.
Moore, Charles W.
Moreland, Theodore E.
Morris, Absalom M.
Morrison, Thomas

Naile, George W.
Newton, E. C.
Nichols, J. Hervey
Nichols, A. M.
Nohe, A. W.
Norris, James B.

O'Brien, Dr. John E.
O'Brien, Richard
O'Neal, William C.
Orton, Albert W.
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.
Phelps, Ransom
Plum, Henry W.
Plum, William R.
Pond, Chester H.
Pope, J. William
Power, Richard
Prichard, John W.
Purcell, P. Jos. A.

Railton, G. W.
Rand, D. E.
Rawlings, T. E.
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.
Sholes, Cass G.
Shoch, W. W.
Shrigley, James A.
Shuman, W. A.
Sisson, W. H.
Sloat, Harry D.
Smith, Charles W.
Smith, George K.
Smith, J. Elliott
Smith, Robert H.
Smith, Walter
Snow, H. N.
Spellman, C. H.
Spencer, Harry B.
Sprague, Henry C.
Stewart, D. N.
Stewart, John N.
Stone, Ellis
Stumm, Frank A.
Sullivan, Daniel

Talbot, Robert M.
Talmage, George J.
Taylor, Periander A.
Taylor, W. S.
Thode, George F.
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.
Webb, J. G.
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.

The following members of the United States Military Telegraph Corps have died since the last reunion:

John D. Voltz, Elgin, Ill.; Gen. Thomas T. Eckert, Elberon, N. J.; Milton F. Adams, Wheeling, W. Va.; John W. Pitfield, St. John, N. B.; Capt. Wm. A. Sheldon, New York; A. C. Schnell, Des Moines, Iowa; M. Y. Holley, Chicago, Ill.; John L. Sponagle, Seattle, Wash.; John Harveycutter, Salem, Va.; Jos. Knittle, Brooklyn, N. Y.; Isaac McMichael, Baltimore, Md.; M. D. Crain, St. Louis, Mo.; William A. Dunn, Baltimore, Md.; Jesse H. Robinson, Washington, D. C.; George J. Lawrence, Albion, N. Y.; Thomas Langdon, Minneapolis, Minn.; Thad M. Schnell, Des Moines, Iowa; Joseph Hansen, St. Joseph, Mo.; Geo. C. Peirce, Grand Rapids, Mich.; John E. Jayne, DeWitt, Mich.; L. Ford Perdue, Terre Haute, Ind.; J. C. Duncan, Knoxville, Tenn.; Wm. D. Sargent, Brooklyn, N. Y.; Madison Buell, Buffalo, N. Y., and Phil. B. Fraser, Stockton, Cal.

The following members of the Old-Time Telegraphers' and Historical Association have died during the past year:

I. W. Hallam, W. A. Van Orden, A. B. Crane, Wm. H. Jackson, Fred Catlin, T. P. Scully, C. W. Black, Anthony F. Saunders, John A. Caldwell, K. C. Morehouse, Jas. L. Miller, F. E. Chaffey, Wm. G. Moffett, J. B. Boyer, Chas. A. Gill, A. J. Brahany, S. S. Dickenson, D. R. Downer, A. E. Sink, Geo. A. Sinclair, B. F. Dillon, W. N. Eastabrook, Jerome Hill, Wm. H. H. McCormick, L. C. Whitney, Fred N. Bassett, A. A. Offutt and C. J. Lawson.

Addresses Wanted.

We are requested by Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, 658 Broadway, New York, to ask our readers who may know the addresses of any of the members named in the following list to advise him at once by postal card:

Armstrong, Ewing L.; Benedict, C. H.; Hauxhurst, H. C.; Hood, Oliver Perry; Huyck, Maynard; Lowe, James; McCleverty, Jos. D.; McMurtry, B.; Shuman, W. A.; Sisson, W. H.; Stone, Ellis; Taylor, Periander A.; Waddell, F. G.; Waddell, Orin J.; Webb, J. G. and Webster, Geo. C.

Mr. J. Elliot Smith, formerly and for many years superintendent of fire alarm telegraphs of New York, and an Old Time and Military Telegrapher, now living in retirement at Portland, Me., writes: "You are quite right in keeping me on your list of subscribers. I never fail in finding something in the AGE of interest except the passing on of some one of the 'old guard.'"

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The Railroad.

Mr. W. F. Williams, superintendent of telegraph, Seaboard Air Line, Portsmouth, Va., was a recent New York business visitor.

Mr. F. S. Spafard, assistant superintendent of telegraph Chicago, Rock Island and Pacific Railway, Chicago, is now acting superintendent of telegraph, filling the vacancy caused by the death of J. G. Jennings.

Mr. E. E. Lillie, superintendent of telegraph and of car service of the North Bank railway, Portland, Ore., has been promoted to the position of superintendent of telegraph of the Spokane and Inland Empire Railroad, with headquarters at Spokane, Wash.

Mr. Charles Selden, superintendent of telegraph of the Baltimore & Ohio Railroad Company, Baltimore, Md., has been appointed inspector of transportation of the entire system in addition to his duties as superintendent of telegraph. This promotion is a further recognition of Mr. Selden's ability as a railroad official.

J. G. Jennings, superintendent of telegraph of the Chicago, Rock Island & Pacific Railroad, Chicago, and a prominent member of the Association of Railway Telegraph Superintendents, died in Chicago, August 19. Mr. Jennings attended the recent Boston cenvention of the Association and was then in the best of spirits. His many friends will be shocked to learn of his untimely death. Mr. Jennings was born in Bellaire, Ohio, June 4, 1862. After leaving school, in 1878, he accepted a position on the Pennsylvania lines west of Pittsburgh, and remained with that company until July, 1904, when he received the appointment of superintendent of telegraph of the Rock Island lines.

M. H. Clapp, Superintendent of Telegraph, Northern Pacific Railway.

Mr. Martin H. Clapp, division plant superintendent of the Western Union Telegraph Company at Chicago, has accepted the position of superintendent of telegraph of the Northern Pacific Railway with headquarters at St. Paul, Minn., vice Mr. O. C. Greene, retired. Mr. Clapp was born at Montague, Mass., in 1874. After attending the common and high schools in Massachusetts, he was graduated from the Worcester Polytechnic Institute in 1895 with the degree of S. B., in electrical and mechanical engineering. After graduating, he worked for a year in the General Electric Company's shop at Schenectady, N. Y., and afterwards for eight years for the American Telephone and Telegraph Company in various positions, as inspector, district inspector, special agent, etc. He was with the independent telephone interests for three years in the Middle West, serving first as consulting engineer of a conference committee, composed of members from various independent telephone companies. For a short time he was chief engineer of the Kinloch Long Distance Telephone Company, at St. Louis, and later chief engineer of the Rochester Telephone Company at Rochester, N. Y.

Over four years ago Mr. Clapp returned to the Bell interests and served one year as supervisor of maintenance for the American Telephone and Telegraph Company of Chicago. For two and one-half years he was division superintendent for the same company at Chicago, and in August, 1910, was appointed division plant superintendent of the Western Union Telegraph Company in that city.

Mr. Clapp assumed his duties as superintendent of telegraph of the Northern Pacific Railway Company August 1. He is an associate member of the American Institute of Electrical Engineers.

Obituary.

E. H. Brown, aged 67, formerly manager of the Western Union office at St. Louis, Mo., died in Chicago July 20. At the time of his death he was in the employ of the Postal Telegraph-Cable Company, at Chicago.

Miss Anna M. McNerny, formerly attached to the manager's office of the Western Union Telegraph Company, Buffalo, N. Y., died in that city recently. She was a sister of Mr. J. G. McNerny of the Buffalo office.

Capt. George W. Harrison of Piedmont, W. Va., a veteran telegrapher and railroader died at that place on June 6 of congestion of the lungs. He was seventy-four years of age and a native of Wheeling, W. Va. Capt. Harrison rendered valuable service to the government all through the years of the rebellion, either in the telegraph or the railroad departments. He was also private secretary to Senator Henry G. Davis of West Virginia during that gentleman's term of office. He was well known to the telegraph fraternity and an occasional attendant at the reunions of the Old Timers. Capt. Harrison held important railroad positions for many years until about three years ago when he retired from further active duties.

Madison Buell, one of the oldest and best known telegraphers in the United States, and an electrician and inventor of note, died in Buffalo, August 20, at the age of 77 years. Seven years after the invention of the telegraph by Professor S. F. B. Morse, Mr. Buell entered the Buffalo office of the New York, Buffalo and Albany Telegraph Company as messenger, in February, 1847. In November of the same year he became an operator. On the breaking out of the Civil War, in 1861, he went to Washington to enter the Government telegraph service, at the request of General E. S. Sanford, president of the American Telegraph Company, at New York. Mr. Buell was assigned to several positions of trust during the war, and was selected by Secretary of War Stanton and Major Thomas T. Eckert, to fill the post of superintendent of telegraph of the line between Washington and General McClellan's army during the peninsular campaign. He was in charge of this line for nearly four years, and was highly complimented by his

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superior officials for the able manner in which he performed the delicate duties of his position. Mr. Buell invented and introduced the universal switchboard which is now in general use. He has been located in Buffalo with the Western Union Telegraph Company for many years, and has held various positions of trust with that company.

Inter-Phone Bulletin.—"The Selection, Installation and Wiring of Inter-Phone Systems" is the title of Bulletin No. 1105, just issued by the Western Electric Company. It is a very complete and comprehensive bulletin on the subject of interior telephone systems and is illustrated with sixty-six cuts and diagrams. Twelve different systems are described including sets used for two to six-party common ringing and common talking service, and sets for twenty-four station installations where selective ringing and selective talking are desired. The bulletin tells how to choose the best system for every conceivable service, and gives valuable information on the installation of the sets.

Western Electric's July Business.—The gross sales of the Western Electric Company for July show a falling off of three per cent. as compared with the same month last year, but the seven months of the current fiscal year which have elapsed are four per cent. ahead of the corresponding period of last year. The showing to date, which is at the rate of $66,000,000 for the year, is close behind the company's high record of $69,000,000 for 1906.

Telephone Train Dispatching on Toledo and Ohio Central.—The Toledo and Ohio Central Railroad has ordered forty-eight Western Electric telephone selector equipments for use on its Eastern Division. There will be two circuits equipped, one extending from Bucyrus to Toledo, a distance of seventy miles, and the other from Bucyrus to Thurston, a distance of seventy-eight miles.

Telephone Train Dispatching.—The Chicago & Northwestern Railroad, which has had Gill selectors in use for some time between Chicago and Fond du lac, Wis., has placed an order for thirty-eight Gill selector local battery Bell telephone train dispatching outfits, together with two 40-key cabinets for Gill calling keys.

New Supply House for Richmond.—The Western Electric Company will soon open a supply house in Richmond, Va. It will be in charge of Mr. H. W. Hall, formerly manager of the Denver house.

Removal of Headquarters.—The Smith Premier Typewriter Company has recently removed its executive offices from Syracuse, N. Y., to 319 Broadway, New York.

Prizes for New Subscriptions To Telegraph and Telephone Age.

TELEGRAPH AND TELEPHONE AGE offers prizes to the amount of $100 in cash to those of its regularly appointed agents who send in the greatest number of new subscriptions and renewals during the months of September, October and November, and up to December 21. The prizes will be distributed as follows: First, $50; second, $25; third, $15, and fourth and fifth, $5 each.

Following is a copy of the notice sent to all agents of this publication:

"As a special incentive to our agents to put forth their best efforts to get us new subscribers, we are offering $100 in cash prizes to those who send us the greatest number of new subscriptions and renewals during the months of September, October and November, and up to December 21, which will be the closing date of the contest. These prizes will be distributed as follows: First, $50; second, $25; third, $15, and the fourth and fifth, $5 each.

"This will be an excellent chance for agents to earn a substantial amount of money not only by capturing a prize, but also from the usual commissions earned from the subscriptions sent in.

"We have endeavored to make the prizes large enough to be attractive and think we have made it well worth your while to put forth your best efforts to secure one of them.

"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 four months, and we are certain that with a little effort on your part you can assist us very materially to increase our field of usefulness along educational lines. Money must accompany all orders for subscriptions and you will be posted in each issue of the paper or by circular as to the progress of the contest. 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, which is unlikely, 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.

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ORGANIZED 1867

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M. J. O'LEARY, Secretary

P. O. BOX, 510, NEW YORK

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AGE	FULL GRADE	HALF GRADE
18 to 30	$1.00	50 Cents
30 to 35	$1.25	63 Cents
35 to 40	$1.50	75 Cents
40 to 45	$2.00	$1.00

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Wireless Ship Operators.

Since the Wireless Ship Act went into effect on July 1, one hundred and forty-eight candidates for wireless ship operator's certificates have been examined at the Brooklyn Navy Yard up to August 16. Out of that number ten have failed to qualify. The examination is compulsory for all wireless ship operators. The questions are practical and must be answered partly in writing and partly verbally, but all bear distinctly on the wireless apparatus.

The principal cause of the failure of these applicants to pass the examination was their ignorance of wireless apparatus. They knew nothing about the instruments. In most cases they were only operators and could not make any repairs or alterations in case of a breakdown or a readjustment.

The main object is to get men who are familiar with the apparatus in their charge and who know how to make adjustments and repairs in time of emergency. The certificates are granted and marked "excellent," "very good," "good." Any operator may apply for examination who has in his possession a letter from a steamship or wireless telegraph company stating that the applicant is or expects to be employed by such company.

Each wireless operator is supplied with a copy of a general letter of instructions regarding the examination of wireless ship operators sent to the collector of customs at New York by the Secretary of the Department of Commerce and Labor at Washington. After directing attention to Section 1 of the Wireless Ship Act of June 24, 1910 (see page 347 of our issue for May 16), the instructions read as follows:

"(1) On March 29, 1911, you were advised that wireless operators, holding valid certificates, issued by any government which is a party to the Berlin Radiotelegraphic Convention, will be recognized as persons 'skilled in the use of such apparatus,' unless in the case of a specific individual there may be good reason to doubt the operator's skill and reliability. Such certificate should be ready at hand for the inspection of customs or other officers before the ship departs from the United States.

"(2) Pursuant to the power bestowed upon the Secretary of Commerce and Labor by Section 4 of the Wireless Ship Act of June 24, 1910, the following regulations are promulgated for other wireless ship operators.

"(a) The Department of Commerce and Labor will issue operators' certificates of skill in radiocommunication, and operators holding them will be recognized as persons 'skilled in the use of such apparatus' within the meaning of the Act cited, unless in the case of a specific individual there may be good reason to doubt the operator's skill and reliability. Such certificates should be ready at hand for the inspection of customs or other officers before the ship departs from the United States. It is recommended that they be kept in the wireless operating room.

"(b) To secure a certificate an operator will pass an examination in the adjustment of apparatus, correction of faults, change from one wave length to another, transmission and sound reading at a speed of not less than fifteen words a minute, American Morse, twelve words, Continental.

"(c) The examinations will be held at the United States Navy Yards at Boston, Mass., Brooklyn, N. Y., Philadelphia, Pa., Washington, D. C., Norfolk, Va., Charleston, S. C., New Orleans, La., Mare Island (San Francisco), Cal., and Puget Sound, Wash., and also at the Bureau of Standards, Washington, D. C. On the Atlantic and Gulf coasts the examinations will begin on or about May 15; on the Pacific coast, on or about May 18. Applicants for certificates should communicate in writing with the Commandants of the Navy Yards named, or to the Director of the Bureau of Standards to ascertain the day and hour when they can be examined. The certificates will be at the places named.

"(d) After an applicant has secured a certificate he should go before a notary public to take the usual oath for the preservation of secrecy of messages received in the line of duty.

"(e) The certificate will be valid for two years, subject to suspension or revocation by the Secretary of Commerce and Labor for cause."

Chief Gunner W. H. F. Schluter, U. S. N., assistant to the officer in charge of the electrical class at the Brooklyn Navy Yard is conducting the examinations at that point.

Large Reproduction of a Cablegram.—On page 564 of our issue for August 16 we presented a picture of a large reproduction of a cablegram of congratulation from Mr. Adolphus Busch to the delegates at the recent convention of the American Medical Association who visited his beautiful gardens in Pasadena, Cal. The group in the foreground included Mr. Moody Rosenquist, manager of the Postal office at Pasadena, Cal., besides those mentioned in the article accompanying the picture. Mr. Rosenquist's friends will no doubt readily recognize his features as the picture is a particularly clear one.

Heliographic Signaling.—Heliographic signals were exchanged recently between Mr. Charles J. Glidden, a well-known former telegrapher and telephone official on Appledore Island, Isles of Shoals, Mass., eight miles at sea, and Mr. S. A. Booth, at New Castle, N. H. The Morse telegraph code was used.

Telegraphs and the Hot Weather.—The extremely hot weather experienced this summer, accompanied by severe thunderstorms, considerably affected the telegraph systems on the Continent of Europe, and caused long delays and congestion of business on the wires.

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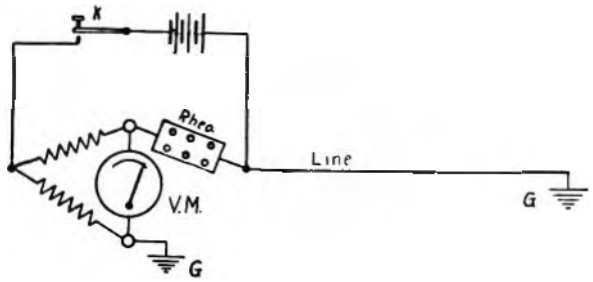
Measuring the Resistance of Grounds.

BY D. B. GRANDY, ST. LOUIS, MO.

It is often desirable to ascertain the condition of ground connections. A defective ground will interfere with the proper working of a quadruplex, prevent lightning arresters from performing their protective functions, and may become a source of danger to telephone and telegraph apparatus, and even to the safety of those in charge.

Before the advent of the generator, it was possible to obtain fairly accurate measurements of the resistance of grounds by direct measurements with the bridge, but this method is not now feasible. One of the methods in use by the American Telephone and Telegraph Company which gives very satisfactory results, is given as follows:

The line and ground connections are directly the reverse of those used for the "Varley" measurement. Either a Thompson, or tangent galvanometer or a voltmeter, should be used, as the ordinary galvanometer does not show the de-



MEASURING THE RESISTANCE OF GROUNDS.

grees of deflection. The procedure is as follows: Ascertain the resistance of the wire to be used, then connect it to the distant ground which it is desired to measure. Plug out all resistance in the rheostat, and note the deflection caused by the "ground current," with key open. This will usually vary considerably, but the mean average deflection should be taken. Call this zero. Then close the key, with positive pole of battery to line, unplug resistance until the same mean deflection is obtained, which call X. Reverse the battery, again close the key and change the resistance until the same mean deflection is again shown, which call Y. Then, $2\frac{XY}{X+Y}$ = resistance of the home and distant grounds, plus that of the wire. Deducting the resistance of the wire, the remainder is the resistance of the home and distant grounds. If the home ground was properly installed, its resistance should be practically nothing, and the figures obtained would be the resistance of the distant ground alone.

Study of the Quadruplex.

The duplex and quadruplex of today are, in principle, the same as they were in the beginning, the differences being largely due to refinement of details. An excellent book on the quadruplex is that of Maver and Davis', "The Quadruplex," which was published many years ago but which is still a valuable work on the subject. The chief feature of the book is its easy method of describing the principles underlying the duplex and the quadruplex, and after these have been mastered the minor differences in the present day instruments can be readily understood.

In our department headed "Questions to be Answered" we are now using "The Quadruplex" as a basis for questions, in the same manner as was done with Jones' book of diagrams.

Besides the duplex and quadruplex the Wheatstone system of telegraphy is fully described and illustrated, and a chapter on repeaters gives a very clear explanation of the principal repeaters in use in this country.

From the chapter headings an idea of the scope of the work may be obtained. Chap. 1. Development of the Quadruplex; 2. Introduction and Explanatory; 3. The Transmitter, Rheostat and Condenser; 4. Stearns Duplex; 5. Instruments of the Polar Duplex; 6. The Polar Duplex; 7. The Quadruplex; 8. The Dynamo-Electric Machine in Relation to the Quadruplex; 9. The Practical Working of the Quadruplex. The two last chapters are on Telegraph Repeaters and the Wheatstone Automatic Telegraph. Copies of this book may be obtained at $1.50 each by addressing Telegraph and Telephone Age, 253 Broadway, New York.

Boston Postal Outing.

On the invitation of president Clarence H. Mackay, extended through superintendent C. A. Richardson, about forty Boston officials, branch managers and clerks and out-of-town managers enjoyed an outing at Nantasket Beach on Saturday, August 12. Meeting at the offices of superintendent Richardson at 1 o'clock, acquaintances were renewed, and Mr. F. B. Travis, the newly appointed manager, was introduced. Mr. Travis, however, is no stranger to the employes of the Postal company in Boston as he was chief operator of that office for ten years prior to 1908 when he was appointed manager at Washington, D. C. Mr. Travis has been in the service of the company for twenty-one years and the outing was delayed for some time that he might be present. Co-operation and the promotion of good fellowship was the keynote of informal talks by Messrs. Richardson and Travis. After a most pleasant sail down the harbor the party spent a few hours bathing and visiting the different attractions, followed by a banquet at the Paragon Park palm garden, returning to Boston by a late boat. Those who took the trip were: C. A. Richardson, superintendent; F. B. Travis, manager; J. D. McDonald, chief operator; L. W. Hoyt, wire chief; J. J. Coen and P. J. Farrell, assistant wire chiefs; D. Carter, traffic chief; C. W. Lanfair, night chief operator; F. J. McGinnis, assistant cashier; F. Ferry, J. J. Driscoll, D. F. Kinnealy, W. A.

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Reicherter, clerks; G. W. Downey, J. A. Coughlan, J. J. McCarthy, R. E. Tobin, F. M. Simms, J. J. Kennedy, P. M. Batchelder, P. S. Durgin, J. A. Finn, J. R. Sullivan and R. C Smith, branch managers, all of Boston; and the following out-of-town managers: W. H. Reagan, Fall River, Mass.; N. S. McDonald, New Bedford, Mass.; T. B. Walsh, Fitchburg, Mass.; I. W. Colbath, Haverhill, Mass.; P. J. Macken, Springfield, Mass.; G. S. Bowser, Lynn, Mass.; F. N. Cooke, Worcester, Mass.; C. C. Ramsay, Portland, Me.; H. C. Knowles, Pawtucket, R. I.; L. A. Boone, Newport, R. I.; F. J. Dickey, Manchester, N. H.

Postal Conference in Pittsburgh.—District superintendent Henry Scrivens, Pittsburgh, Pa., entertained fifteen managers of his principal offices on August 15, in that city. The party spent the morning in sightseeing and had luncheon at one of the principal hotels. They afterwards attended the National League baseball game. This was followed by a conference of several hours, winding up the day with a dinner at the Fort Pitt Hotel. During the dinner several interesting addresses were made and a group photograph taken. The affair was greatly enjoyed by those who participated.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

Edwin Butler, aged 57, an old employe of the machine shop, 195 Broadway, died at New York August 11.

Mr. Jacob F. W. Ulrich of this office has sailed for Brazil, where he has accepted a position with the Amazon Wireless Telegraph and Telephone Company. He is a native of New York where he was born September 21, 1859, and his entire business career has been spent in and near this city. He has been an attaché of this office for the past thirty years.

NEW YORK POSTAL.

E. W. Applegate, aged 62, an operator in this office, died at his home in Hoboken, N. J., on August 24. Mr. Applegate had held many important positions in the telegraph service and had been at different times identified with machinery interests. He was also an inventor of many electrical devices, and a first class operator and electrician. He was identified with the Western Union service beginning at Toledo, Ohio, in 1875, and was at one time chief operator of the New York main office of this company when it was located at 187 Broadway.

The great telegraphic song hit, "SEND ME A NIGHT LETTER, DEARIE." Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.

B. L. BRANNAN,
195 B'way, N. Y.

AMARILLO, TEX., WESTERN UNION.

An overland repeating station has been established at this point and the office equipped with a modern plant. Mr. H. W. Cantrill, for several years repeater chief in the overland division at Albuquerque for the Postal Telegraph-Cable Company, has been appointed manager. Mr. H. L. Converse, former repeater chief at Des Moines, Iowa, with the Postal company, has been appointed chief operator, and A. W. Daniels and J. H. Crane second and third trick chiefs, respectively.

T. M. B. A. Assessment.—Assessment No. 528 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of William J. Lee at Washington, D. C.; John E. Grace at Lundy's Lane, Va.; Charles M. Campbell at Williston, N. D.; David Bailey at Boston, Mass.; Joseph Hanson at Hot Springs, Ark.; Harmon M. Sage at Evanston, Ill.; Jacob Klein at Rochester, N. Y.; Winfield S. Cole at Avon, N. Y.; Barney Murtha at Cincinnati, Ohio; James Goodall at Sayre, Pa.; Charles H. Lord at Seattle, Wash., and John S. Dunnavent at Clinton, Ky.

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.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

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Telegraph and Telephone Age

No. 18. NEW YORK, SEPTEMBER 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Special Features of the Athearn Quadruplex.

(Concluded.)

The new standard quadruplex installed by the Western Union Telegraph Company since the combination with the American Telephone and Telegraph Company differs from the old apparatus principally in the manner employed to steady the current and accelerate the building up of the signals. Heretofore the outgoing current has been greatly retarded not only in reaching the external conductor by first having to traverse an unnecessary amount of inductive resistance in the home set, but also in being choked back and banked up, so to speak, when it encountered similar conditions in the distant apparatus. This caused an unevenness in the current in the line which tended to retard the formation of signals, besides becoming a source of induction to be felt on adjacent circuits.

In addition, the former arrangement permitted the static, or return charge of the wire to exert its full power except as far as its effect could be diminished by neutralization. In the new quadruplex this charge, or at least as much of it as is not neutralized, is utilized to good advantage by forcing it through the coils of a holding magnet in close proximity to the lever of the neutral relay.

Again, although choke or impedance coils are added to the circuit the normal current does not choke up on the line as in the old system, but divides between an inductance and a useful channel at the end of its journey, where it acts quickly. Furthermore, as the polarized relay is placed in a bridge the resistance of its coils to the outgoing current is practically eliminated. Hence the home current reaches the external circuit sooner in the new than in the old method.

These claims are of course somewhat general in character and by some persons may be considered a mere assertion, but the fact that Mr. Athearn's quadruplex actually works on all four corners on the same circuits that were thus unworkable with the old apparatus, proves conclusively that such claims are well founded.

If the reader will study closely the operation of each new accessory with which this multiplex system is equipped he will not only perceive that the beneficial results expected should naturally follow, but will also derive much interesting information in the explanations given as to the causes of such results.

For instance, note the manner in which the static is utilized to energize the holding coil on the neutral relay, which is in series with a condenser.

Mr. Wm. Finn, in his description of the quadruplex published in this journal November, 1910, expressed the action clearly in these words:

"At the moment battery contact is broken at the distant polechanger the magnetism previously excited in the receiving apparatus suddenly collapses, and in doing so generates an 'extra current' that is utilized by affording for it a path through the holding coil, the direction of the current being made to correspond with the discharge from the holding condenser whose plates had been previously charged by the distant battery current."

This extra current, it may be added, is further amplified by the presence of the impedance coils which form part of the multiplex equipment. The combination of all these hitherto undesirable effects, now acting in concert and in the proper direction, causes the holding magnet to retain the lever of the neutral relay firmly on its contact points until the period of break is over.

The impedance coil is also valuable in other ways. The magnetic variations in the core of impedance coils caused by the operation of the distant polechanger create momentary extra currents, part of which find their way through the bridged polar relay, and as their direction is invariably the same as that of the incoming or marking current, they strengthen the polar side also. The impedance coils in combination with the spark condenser also tend to dampen the usually sharp or abrupt breaking of the current when signals are made, hence the induction felt in adjacent circuits when this quadruplex is working is diminished.

Some day when all multiplex circuits are equipped

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with this apparatus, or something similar, the induction problem will have been nearly solved and the harmful effect now experienced in adjacent telephone circuits greatly diminished.

The lesson this teaches is that experiments in the way of eliminating inductive effects in nearby circuits should be directed towards evolving an effective method of "damping" instead of neutralizing the induction. Damping prevents or at least tends to weaken such effects in the conductor itself, while neutralization is merely a compensating method which quiets the instruments in circuit and does not attack the cause.

Recent Telegraph and Telephone Patents.

ISSUED AUGUST 15.

1,000,421. Primary Electric Battery. To G. A. Lutz, Plainfield, N. J.

1,000,488. Party-Line Telephone System. To W. M. Bruce, Jr., Springfield, Ohio.

1,000,499. Telephone Transmitter. To W. W. Dean, Elyria, Ohio.

1,000,601. Ink-Writing Telegraph Register. To B. Hurd, Nutley, N. J.

1,000,614. Wiring System for Automatic Telephone Exchanges. To F. R. McBerty, New Rochelle, N. Y.

1,000,795. Telephone-Transmitter. To F. Gottschalk, New York.

ISSUED AUGUST 22.

1,001,070. Lock-Out Telephone System. To N. E. Norstrom, Chicago, Ill.

1,001,227. Aerial for Wireless Telegraphy and Telephony. To W. E. D. Stokes, Jr., New York, and G. W. Davis, Galilee, N. J.

1,001,228. Receiving Circuit for Wireless Telegraphy and Telephony. To W. E. D. Stokes, Jr., New York, and G. W. Davis, Galilee, N. J.

ISSUED AUGUST 29.

1,001,685. Telephone. To A. G. Remhilt, Philadelphia, Pa.

1,001,723. Telephone System. To C. S. Winston, Chicago, Ill.

1,001,959. Telephone Selective Signaling Ringer. To H. L. Johnson, Topeka, Kan.

1,002,049. Signaling by Electromagnetic Waves. To R. A. Fessenden, Fortress Monroe, Va.

1,002,050. Receiver for Signaling. To R. A. Fessenden, Washington, D. C.

1,002,051. Signaling by Electromagnetic Waves. To R. A. Fessenden, Washington, D. C.

1,002,052. Electric Signaling. To R. A. Fessenden, Brant Rock, Mass.

Personal.

Mr. Frank Kane of Washington, D. C., a well-known old time member of the profession, was a recent New York visitor.

Mr. Harry E. Dunham, formerly associate editor of TELEGRAPH AND TELEPHONE AGE, and now an assistant examiner in the Patent Office at Washington, was a recent New York visitor.

Mr. Arthur Walsh, an Old-Time Telegrapher, and a member of the Society of the United States Military Telegraph Corps, formerly at Auburn, Neb., is now located at Van Nuys, Los Angeles, Cal.

Mr. G. H. Corse, jr., representative of the Chicago, Milwaukee and St. Paul Railway Company at Shanghai, China, was a recent New York visitor. Mr. Corse is on a two months' leave of absence and is visiting various parts of the country.

Mr. F. L. Hutchinson, acting secretary of the American Institute of Electrical Engineers, in place of Mr. Ralph W. Pope, resigned, has been appointed to act as secretary until the end of Mr. Pope's unexpired term, August 1, 1912, or until the earlier appointment of a secretary.

Mr. George E. Hines, of New York, inventor of the improved duplex and quadruplex described in our issue for April 1, has issued a pamphlet on the general subject of multiplex telegraphy, comparing the old methods with his. Mr. Hines' invention is ingenious and is radically different from the quadruplex apparatus in general use.

Mr. Daniel Colestock, a member of the Society of the United States Military Telegraph Corps, and formerly an operator in the Western Union Pittsburgh, Pa., office, and now a retired business man of Titusville, Pa., together with a brother and two sisters, held a family reunion in Alliance, Ohio, recently. The total of the ages of the four survivors is 311 years. Mr. Colestock is vice-president of the Titusville Forge Company.

Dr. A. E. Kennelly, professor of electrical engineering at Harvard University, Cambridge, Mass., and a former telegrapher, sailed on August 26 for Europe. He will attend the meeting at Turin, Italy, of the International Electrotechnical Commission, which will be held in connection with the Turin International Electrical Congress.

Mr. F. J. Hickey an old time telegrapher and for many years past general agent of the Wells Fargo Express Company at New York has been promoted to the general superintendency of the company with headquarters in New York. Mr. C. V. Fowler, also formerly identified with the telegraph, has been made superintendent of the same interests with headquarters in New York.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, has gone on a trip of inspection to Boston, Buffalo and other cities within these limits that will keep him from his office until about September 18.

Among recent executive office visitors were: Mr. G. H. Usher, general superintendent of the southern division, Atlanta, Ga., and Mr. C. K. Hunt of Winsted, Conn.

Mr. Isaac Smith, superintendent of tariff, New York, is absent from his office on a vacation.

Miss T. N. Brown, chief clerk to Mr. E. J. Nally, vice-president and general manager, New York, is on a two weeks' trip to Chicago.

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This company is installing new and more speedy elevators in its main building, 253 Broadway, New York.

Mr. Lloyd C. McCormick, assistant manager at St. Louis, has been promoted to the position of manager of the Detroit, Mich., office, vice Frank S. Gould resigned.

Mr. William E. Petfield of the South Bethlehem, Pa., office, has been appointed manager at Bethlehem, vice Mr. Charles Anderson, transferred to Philadelphia.

Mr. R. A. Obley, an operator in the Topeka, Kan., office, has been advanced to the management, vice A. B. Matthews resigned.

Mr. L. A. Mitchell, manager of the Jacksonville, Fla., office, ever since the company constructed lines to that city, has resigned to enter the automobile business. Mr. H. R. Waterbury, of the same office, will succeed Mr. Mitchell.

Joseph H. Wentworth, cashier of the Postal Telegraph-Cable Company at Boston, Mass., died suddenly on September 8. He was cashier for the Western Union Company in Boston until 1903 when he entered the Postal company's employ. He was also treasurer of the Martha's Vineyard Telegraph Company at the time of his death.

The following appointments have been made to the new offices in Texas and Oklahoma of the Mackay Telegraph and Cable Company: W. A. Logan, formerly special agent of the Postal Telegraph-Cable Company of Texas, manager at Oklahoma City; T. J. Bolleter of the Postal Telegraph-Cable Company of Texas at Laredo, Tex., manager at Ardmore, Okla.; Watson Dalton, formerly secretary of the Cotton Exchange at Gainesville, Tex., manager at the same place; H. L. Burross, formerly manager of the Western Union office at El Paso, Tex., manager at Fort Worth, Tex., with Joseph Corum, from the Associated Press, as manager of the Cotton Exchange branch office and C. J. Martin of the Texas Postal Company, manager of the stock yards' office at the same point. R. S. Greenwood, of the Western Union Chicago office has been appointed assistant manager at Fort Worth and detailed to outside work. Perry Chamberlain, well known throughout the country and formerly of the Postal Telegraph-Cable Company at New York, is manager at Waco, Tex.; J. S. Lee, former operator and ticket agent for the Cotton Belt Railroad at Waco, is manager at Cleburne, Tex., and A. L. Burge, manager of the Independent Telephone Company at McGregor, Tex., is manager at that point, being assisted by A. Green, operator. Mr. F. C. Lacey has been appointed manager of the Houston, Tex., office. He has been in the service of the Postal Telegraph-Cable Company for over twenty years, at various places, including Peoria, Ill.; Topeka, Kan., and Chicago, Ill.

Mr. Wm. Young Nolly, the new manager of the Dallas, Tex., office of the Mackay Telegraph and Cable Co., was born at Arlington, Tenn., February 15, 1871, and began his telegraphic career in May, 1886, at Little Rock, Ark., on the Iron Mountain Railway. He subsequently held the managerships at Austin, Fort Worth and Dallas, Tex., and Shreveport, La., for the Postal Telegraph-Cable Company, and was afterwards inspector for the Western Union Company for Texas and Louisiana. His wide experience eminently fits him for the duties of his new position.

Postal Telegraph-Telephone Service. — An agreement has just been entered into between the Postal Telegraph-Cable Company, and the Sierra Construction Company which will place a large and prosperous territory in northern California in direct telephonic connection with the system of the Bay Cities Home Telephone Company at San Francisco, Oakland and adjoining cities and towns.

To Enjoin Interference with Telegraph Lines. —The Postal Telegraph-Cable Company has petitioned the federal court at Portland, Ore., for an injunction to restrain the Southern Pacific Railway Company from cutting its wires and disturbing its poles on the railway company's right of way in Oregon.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Newcomb Carlton, vice-president of the company, has returned to his desk after a brief vacation.

Mr. A. G. Saylor, general superintendent has returned from a business trip through the eastern states.

Mr. W. H. Baker, vice-president of the American District Telegraph Company of New Jersey, has returned to his office after a vacation spent in the Adirondacks.

Mr. W. E. Athearn, engineer of equipment, New York, has returned to his office much benefitted by his rest at Martha's Vineyard.

Mr. Frank Kitton, assistant to the engineer of equipment, New York, is away on his vacation.

Mr. W. W. Watt, formerly district plant superintendent of the fifth district, Cleveland, Ohio, has been transferred to Chicago as plant superintendent of the first district. Mr. Watt will look after both districts until the vacancy in the fifth district has been filled.

Mr. J. E. Scofield of the Atlanta, Ga., office has been appointed superintendent at Jacksonville, Fla., vice Mr. L. J. Maxwell, who has been attached to the office of Mr. J. M. Stephens, division commercial and traffic superintendent, Atlanta, Ga.

Mr. Ellis Jordan, manager of the Pittsfield, Mass., office has accepted the managership at Tampa, Fla.

Mr. C. W. Chenault, formerly of Lexington, Ky., has been appointed manager at Johnson City, Tenn., vice R. F. Fowler, resigned.

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Mr. Frank S. Gould, manager of the Detroit, Mich., office of the Postal Telegraph-Cable Company, has been appointed manager of the Grand Rapids, Mich., office of this company.

Mr. Arnold B. Matthews, manager of the Postal Telegraph-Cable Company's office at Topeka, Kan., has accepted the managership of the Western Union office at Great Falls, Mont.

Mr. J. H. Gates, formerly assistant superintendent of the American District Telegraph Company at Columbus, Ohio, is now manager for the Western Union Telegraph Company at Davenport, Iowa.

Mr. L. A. Rudd, manager at Knoxville, Tenn., has been promoted to the management of the Memphis office, and Mr. T. H. Gore, chief operator, succeeds to the management at Knoxville, vice G. E. Woods resigned.

Mr. P. J. Morency, operator for the Oregon Short Line at Salt Lake City, Utah, has been appointed wire chief for the Western Union Telegraph Company at Vancouver, B. C.

Mr. B. F. Ragsdale, chief operator of the Columbia, S. C., office, has been advanced to the position of chief operator at Atlanta, Ga., vice H. K. Griffin, resigned. On his retirement Mr. Griffin was presented with a gold watch and chain by the operating force. He resigned his position at Atlanta on account of his wife's health, and will return to New York, where he will be employed in the quadruplex department.

Mr. F. H. Gournoe, whose appointment as manager of the San Antonio, Tex., office of the Western Union Telegraph Company was announced in our issue of September 1, was born at Euclid, Ohio, May 28, 1874. He began his telegraphic career at Toledo, Ohio, on the Lake Shore and Michigan Southern Railway, and later went to Chicago, where he filled other railroad telegraph positions. Subsequently he was appointed inspector and special agent under Mr. T. P. Cook, general superintendent at Chicago, and was afterward in charge of the overland division in the operating room at Chicago. After a year in this position he was appointed special agent of the Gulf Division at Dallas, Tex., under Mr. L. McKisick, general superintendent, and occupied this position at the time of his recent appointment.

This company is introducing fire drills in all of the large offices throughout the country. The operating department on the eighth floor at 195 Broadway, New York, was cleared in 30 seconds on one occasion and the seventh floor in 32 seconds, and all hands were back to work within one and a quarter minutes. Mr. T. F. Clark of the operating department is the general instructor of the fire drill.

The Cable.

Hon. Thomas Cochrane, of the Direct United States Cable Company, London, England, was a recent New York visitor, coming here on business connected with the service and private interests.

Removal of Cable Office.—The Direct United States Cable Company has moved its main office from 61 to 60 New Street, New York, where a larger space is provided. Mr. Clement Lee is the superintendent.

French Submarine Cables.—The French Cable steamer "Francois Arago" of the Sociéte Industrielle des Téléphones is now engaged in laying cables on the West African coast between Libreville, Cap Lopez and Loango Pointe Noire in the Congo region, to the order of the Ministry of the Colonies for French Equatorial Africa. It is expected that the cables will be laid and open for traffic in October. The total length of the cables is about 600 nautical miles.

Cables Rates.—The Pacific Cable Board in a report to the English Parliament states that a general agreement has been reached, and there is every prospect that within the next few months it will be possible for messages in plain language to be sent at half the existing rates, subject only to the condition that the transmission of them must wait for a period, not exceeding a twenty-four-hour interval, during which the cable is not in use for traffic at ordinary rates.

Municipal Electricians.

Lafayette, Ind.—Improvements are to be made in the fire alarm system in this city.

Police and Fire Alarm.—A police and fire alarm system is to be installed at Tomah, Wis.

Fire Alarm Installations.—The taxpayers of Nyack, N. Y., are to vote on a $7,000 appropriation for the installation of a fire alarm system. The fire committee of Montpelier, Vt., has decided to install a fire alarm system.

New Fire Alarm Indicator.—A new alarm indicator for fire stations is being introduced in Newark, N. J. It has three panes of glass, behind which incandescent lamps can be so arranged as to show the signaling box by numeral or special signs. The apparatus can be worked by hand or automatically by the usual Morse alarm signals. To save the time necessary for finding on a chart the spot from which the alarm was sent, it is proposed to use a translucent map to be illuminated by the alarm, and showing all boxes of the fire department area by numbered disks. The call will also show a red light behind the disk for the signaling box and another for the station, so that the best route to the fire would be seen at a glance.

The Telephone.

Mr. William C. Maas commercial superintendent of the Southwestern Telephone and Telegraph Company at Little Rock, Ark., has been promoted to a similar position covering the Northeast Texas division of the same company, with headquarters at Dallas.

Time by Telephone.—It is stated that 80,000 telephone subscribers in Chicago call up "Central" every day to get the correct time.

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Improving Telephone Service in Paris.—The sum of $2,333,540 has been appropriated for the improvement and extension of the Paris telephone system.

Wireless Sea Telephone.—Mr. A. W. Sharman of London, England, has invented a wireless telephone by which, it is asserted, talking from one vessel to another in mid-ocean will be possible.

Telephone Bond Issue.—The Southern Bell Telephone and Telegraph Company has filed a trust deed in Georgia, Florida, Alabama, North Carolina, South Carolina and West Virginia covering a $50,000,000 bond issue. The bonds will mature January 1, 1941.

Telephonic Communication Between European Capitals.—There is a prospect that telephone communication between London and Berlin will soon be an accomplished fact. The new service, it is stated, is dependent upon a new land line which the French authorities have under construction to the German frontier, and when this is completed and linked up with the German line there will be direct communication between Berlin and London via the new cable which has been laid across the Channel by the British Government. There is also said to be a project on foot to establish a telephone line between Berlin and St. Petersburg.

The Early Days of Telephony.—The *Telephone Review* for August contains reproductions from the *Poughkeepsie Eagle* of October 24, 26 and 29, 1877, of accounts of the introduction of the telephone in that city. The line ran from the Atlantic and Pacific Telegraph office to Eastman College and the tests in the telegraph office were conducted by Mr. Frank C. Mason, formerly superintendent of the Fire Alarm and Police Telegraph in Brooklyn, N. Y., who was the operator in the Poughkeepsie office at that time. According to the accounts the tests were successful and it is recorded that an application was made by James Hyatt, of Bagnall, to have a telephone line connect his residence with the railway depot at that place.

President Vail on the Cable Situation.

Mr. Theo. N. Vail, president of the Western Union Telegraph Company, New York, has issued the following statement in regard to the trans-Atlantic cable situation:

A provisional modification of an arrangement which has existed for many years has been reached between the Western Union Telegraph Company, the Anglo-American Cable Company and the Direct U. S. Cable Company, under which the cable systems of these companies now worked exclusively in business connection with each other, but operated and maintained separately, will be operated in direct physical connection with each other and with the Western Union land system.

Two objects are to be attained by this arrangement:

First, more efficient and economical operation.

Second, the introduction of new forms of service to the advantage of the public.

The trans-Atlantic cable situation is as follows:

The Mackay group of seven cables, including the German cables, owned by or worked in physical connection with the telegraph lines of that company form one system.

The French cables comprise an independent system, using both the Western Union and the Mackay land lines for their United States connection.

In competition with these is the Western Union group of cables, eight in all, owned by three separate companies, two of which are British companies owning five of the eight cables.

Two only of the British owned cables terminate in the United States and all of them are entirely dependent on the Western Union for their connection with any telegraph system, or for their reaching any center of business, and are now worked exclusively, so far as business is concerned, with the Western Union.

The proposed arrangement between the Western Union, the Anglo-American and the Direct U. S. companies will bring the eight cables of the three companies under one operating control. The consequent increase in effectiveness and economy will place the Western Union in a position to offer certain advantages in cable service not now enjoyed by the public.

The other way open to enable the Western Union to make such improvements and introduce such new services as it proposes to do, would be to lay new cables. This would seem to be the height of folly. Duplication of the existing trans-Atlantic cable facilities at a cost of many millions, when there are more than ample facilities for all business, would put an unnecessary financial burden upon an already fully burdened business and would probably postpone the reduction of rates or introduction of new services.

As at present carried on, the trans-Atlantic cable business is practically all flash service, i. e., instantaneous. Owing to the difference in time, there are only a few business hours of the day common to both sides and during these hours at least seventy-five per cent. of the cable business is done.

In the interests of international business nothing should be done to interfere in any way with the so-called flash or instantaneous service, and the lines should be kept clear to accommodate such messages during the few business hours common to both countries; but to continue to confine the cables to this class of service, as at present, will utilize only about twenty-five per cent. of the existing capacity of millions of property and places on that limited service all the capital, maintenance and operating charges.

The limited time and the character of the business, if best results are to be obtained, demand direct cable circuits between principal centers of

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the two sides of the Atlantic, as well as special circuits devoted to special business.

To meet these requirements it is essential not only that there be at all times sufficient cable facilities, under one control, but that they should be operated interchangeably with each other and in close physical connection with land lines as one system. Ample spare facilities are necessary to provide against the very frequent cable interruptions.

Neither the Western Union nor any one of the companies of the Western Union group has, independently of the others, facilities enough to handle the business which at times any one company might be called upon to take care of, because of some particular rush of business, or because of some cable interruption. Nor could any one company furnish all the direct circuits necessary for efficient service, although the combined facilities of these companies are ample if they could be used supplementary to each other and interchangeably.

As it is, each company operates its own cables through separate and distinct offices and under separate and distinct management. All interchange of business is by actual transfer of the business from one company to the other, with the consequent delay and interruption of a service in which seconds are valuable.

So soon as the proposed arrangement goes into effect, the Western Union purposes, with the consent of the British Post Office Department, to introduce at least two new features or services in addition to the proposed deferred rate—the Daily Cable Letter and the Week-End Cable Letter—at a very low rate for cable service only. This will enable the public to save the six to eight days consumed in the trans-Atlantic passage of mails.

There is no cable monopoly possible. The three systems—the Western Union, the French and the Mackay—will continue to exist.

The Mackay Companies is a holding organization with no physical property, but exercising through stock ownership, lease or contract, operating control of various companies owning land lines and cables which make up the Mackay System. Through this control all the various properties are operated as one system to great advantage in service over what could be given by these same companies if operated separately.

The French cables form another system.

The Western Union system, under the proposed arrangement for one operating control over the present segregated units, will be enabled to make two distinct advances in the trans-Atlantic cable business:

1—*Better Service.* This will be insured by more efficient and economical working resulting from single direction over the operations of both cables and land lines.

2—*Public Advantages.* The greater part of the cable capacity has been and is now unutilized. It will continue to lie dormant and unutilized under existing conditions and traditions. The Western Union purposes to make these wasted facilities useful to the public by means of new kinds of cable service.

In addition, the Western Union intends to nationalize its land lines by opening them to all trans-Atlantic cable companies.

Obituary.

Anthony F. Saunders, aged 53, operator at Kansas City, Mo., died August 10.

Henry Griffith, aged 62, formerly an operator at Augusta, Ga., and later of Baltimore, died in the latter city August 12.

Capt. John C. Butler, aged 79 years, died in Macon, Ga., recently. He was one of the oldest telegraphers in the South.

Mrs. J. B. Dillon, wife of Mr. J. B. Dillon, wire chief of the Western Union Telegraph Company at Dallas, Tex., died at Galveston, Tex., August 21. The remains were taken to Louisville, Ky., for burial.

Chris Reilly, aged 59 years, an old operator, died at Memphis, Tenn., recently. He was an associate of Mr. Thomas A. Edison in the early days when Mr. Edison was employed in the Western Union office at Memphis.

Clarence Cary, aged 65 years, a prominent New York attorney, and for many years previous to 1892 general attorney of the Western Union Telegraph Company, died on August 27, at Greenwich, Conn. Deceased was born in Fairfax County, Va., and during the Civil War served in the Confederate army and navy.

M. Ernest Mercadier, a well-known telegraph authority in France, died in Paris July 27. He was Director of Telegraphs during the siege of Paris, and after the war became professor of physics at the High School of Telegraphy. In 1891 he became director of studies at the Polytechnic School. He was the author of many technical works.

Mrs. Samantha F. Berniholtz, who was chief operator at Gettyburg, Pa., at the time of the battle at that place during the Civil War, died at Waynesboro, Pa., September 10, at the age of 75 years. During the battle of Gettysburg she sent many important official telegrams to the War Department at Washington from commanding officers in the field.

General J. E. Tyrrell, for forty years identified with train dispatching on the Michigan Central Railroad, at Jackson, Mich., died at that place August 8, aged 64 years. For twelve years General Tyrrell was at the head of the Michigan state militia. He had a very eventful career. He took part in the Fenian uprisings in Ireland in 1867; was captured, but through the intercession of friends was released. He came to America with his parents in the early fifties and later learned telegraphy. He also took part in the Civil War and the Spanish-American War. The degree of perfection to which the militia of Michigan has been brought was entirely due to the efforts of General Tyrrell.

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Landing the First Successful Atlantic Cable.

The accompanying illustration is a reproduction of an old print in the possession of the Western Union Telegraph Company at New York, and represents the scene at Heart's Content, N. F., on the landing of the first successful Atlantic cable on July 27, 1866. The following account of the event, taken from Field's *History of the Atlantic Telegraph*, is published in the *Journal of the Telegraph*, together with the illustration.

"On Friday morning, July 13, 1866, the fleet finally bade adieu to land (Valentia, Ireland). Was Friday an unlucky day? Some of the sailors thought so, and would have been glad to leave a day before or after. But Columbus sailed on Friday and discovered the New World on Friday, and so this expedition put to sea on Friday, and as a good Providence would have it, reached land on the other side of the Atlantic on the same day of the week.

"It is Friday morning, the 27th of July (1866). They are up early and looking eastward to see the day break, when a ship is seen in the offing. She is far down on the horizon. Spy glasses are turned toward her. She comes nearer—and look, there is another and another. And now the hull of the Great Eastern looms up all glorious in that morning sky. They are coming. Instantly all is wild on shore. Boats put off to row toward the fleet. The Albany is the first to round the point and enter the bay. The Terrible is close behind. The Medway stops an hour or two to join on the heavy shore end, while the Great Eastern, gliding calmly in as if she had done nothing remarkable, drops her anchor in front of the telegraph house, having trailed behind her a chain of 2,000 miles to bind the old world to the new.

"Although the expedition reached Newfoundland on Friday, the 27th, yet as the cable across the Gulf of St. Lawrence was broken, the news was not received in New York till the 29th. It was early Sunday morning, before the Sabbath bells had rung their all to prayer, that the tidings

SCENE AT THE LANDING OF THE FIRST SUCCESSFUL ATLANTIC CABLE.

came. The first announcement was brief:

"'Heart's Content, July 27.—We arrived here at nine o'clock this morning. All well. Thank God, the cable is laid and is in perfect working order.

"'(Signed) CYRUS W. FIELD.'"

Brazilian Telegraphs.—The Ministry of Communications and Public Works, of Brazil, is to spend about $180,000 for the construction of a building intended for the Postal telegraph office in Nictheroy, State of Rio de Janeiro.

Report on Electrolysis.—The Chicago Board of Public Efficiency has issued a report on electrolysis of water pipes. It contains much information on the subject and will be of interest to telegraph and telephone men.

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The Mercadier-Magunna Multiplex Telegraph System.

The Mercadier-Magunna multiplex system of telegraphy has been tested under the direction of the French government over a line between Paris and Lyons, a distance of about 280 miles. The system is described by Mr. C. L. Durand, in *Electrical Review and Western Electrician.*

On the occasion of the test a quadruplex Baudot printing telegraph of the government type was operated by direct current along with a sextuplex Hughes printer by vibratory currents, making five transmissions each way. Counting each Baudot instrument at 1,550 words per hour and a Hughes instrument at 1,800, the total is 10,800 words per hour. On the usual direct-current method, only the quadruplex Baudot method can be used, so that the capacity of the line is nearly tripled. With Morse sounders or tape receivers the advantage is still greater, and the line will carry four times the usual number of messages.

The Mercadier-Magunna system depends on the use of vibratory transmitters sending alternating current on the line, each at a standard frequency. At the other end is a set of selective receivers, so that each current is received in a separate instrument. Three messages can be thus sent each way in practice. However, this does not prevent sending messages at the same time by the usual direct current, as alternating and direct current are sent over the same wire by using the Van Rysselberghe connection. With the Morse signals the difficulties are even less than with printing telegraphs such as are used in Europe. Given a line which is duplexed as usual on direct current, three messages each way can be added by using the vibratory method, that is, six messages counting both ways. The capacity of the line is now eight messages against two on the usual method. The new apparatus has very little complication, and another point is that none of the regular standard instruments such as sounders, etc., need to be modified. Dots and dashes are sent by key in the same way as before. Where alternating currents are used on the line, the signals are always received as direct current, by the use of relays and local battery circuits.

The transmitter uses a tuning fork which is kept in vibration by an electromagnet placed between branches. One wire of the magnet is connected to one pole of a storage-battery and the other wire to the metallic mass of the fork. Each prong of the fork carries a contact by which the circuit is broken in the usual way by the action of the magnet upon the prongs.

One of the interesting points about the system is the use of a special type of vibrating receiver in order to select the waves of different frequencies which are sent over the line. The inventors designed a receiver which they call "mono-telephone" on account of its resemblance to a telephone. It uses a metal disc which is made to vibrate by the action of an electromagnet, but it differs from the usual telephone principle from the fact that it will be set in vibration by only the waves of the exact pitch for which it is tuned. For instance one of the monotelephones is tuned so as to respond when the operator sends signals by using waves of a frequency of 575, but for other waves it produces no effect whatever.

In designing such instruments, the inventors make use of the properties of vibrating plates. When a metal plate is placed horizontally and is sprinkled with sand, and the plate is then made to vibrate by striking the edge, the sand is driven off from some portions and is collected upon others. The sand tends to collect upon the nodal lines, where the vibratory movement is zero and on the contrary it is driven away from the strongly vibrating parts. The form of the nodal lines depends upon how the plate is vibrated. Should we vibrate a circular plate by means of an electromagnet placed under the center, we obtain a circular nodal line which corresponds to the first harmonic of the fundamental tone of the plate. Should we now fix the plate by three supporting points lying on the nodal line, such a plate will vibrate at only the pitch corresponding to the first harmonic, and for any other pitch it will be silent. The plate is made to vibrate by mounting a soft-iron disk armature at the middle and placing an electromagnet underneath. Such a disk, can be made of steel, copper, silver, etc., and it is held by three screws upon sliding supports so as to hold it on the base and also leave it free to vibrate. Under the plate is a specially annealed soft-iron disk which is acted upon by an electromagnet. Around the iron core is a concentric soft-iron ring and below is a permanent magnet which is placed so as to magnetize the soft iron parts and form an annular magnet having an equal circular distribution of the lines of force. The magnetic circuit also includes the armature. It is found that such a method is the best for securing the vibration of the disk when the coil receives alternating current. The pitch of the disk depends on its diameter, so that each monotelephone uses a disk of different diameter. The diameter of the nodal line is 0.64 of the diameter of the plate. Such plates are adjusted to the exact pitch by comparing a set of standard tuning forks, and they will respond strongly for a current of the right pitch, but are inactive when the current differs from this by only a small amount, so that the monotelephones form a very sensitive selecting system. Such monotelephones could be used to hear the messages by sound, but it was desired to make them act as relays in order to operate printing telegraphs or Morse tape. On the disk is soldered a platinum plate upon which bears a contact point carried on the end of a lever. The lever is mounted on pivots and the pressure at the contact is adjusted by a counterweight. When the disk vibrates, the lever which

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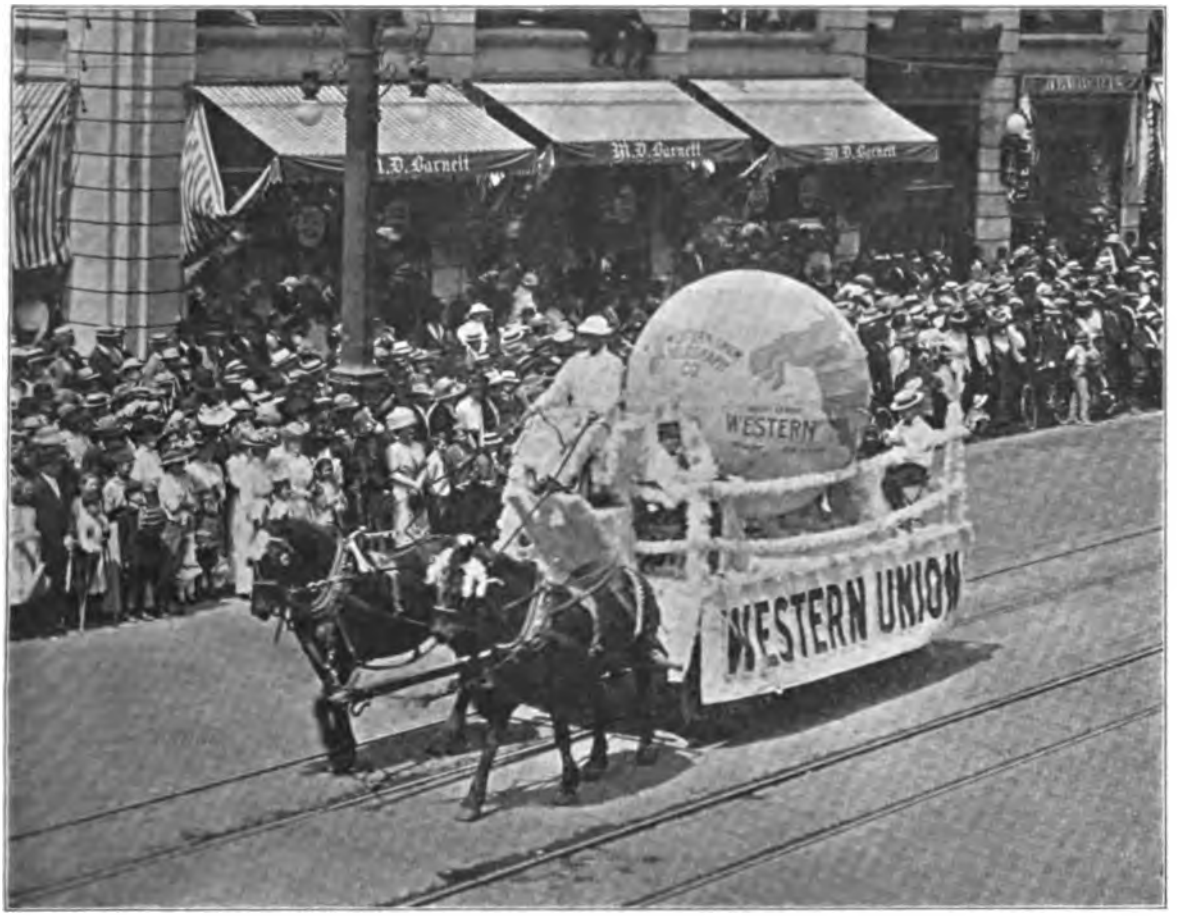
has been so adjusted that its natural vibration is much slower than that of the plate, is unable to follow the vibration of the disk, so that there is a considerable increase in the resistance at the contact of the lever and plate. A direct current passes through this contact for operating a local relay, and the adjustment is such that when the current is diminished the relay will make contact and thus operate a Morse receiver or a printing telegraph. Each signal sent over the line by alternating current gives a like signal in the direct-current receiver.

To secure a better operation, the tuning forks are given a different pitch from the corresponding receivers in the same station, and the difference between the highest and lowest pitch is lessened as much as possible without interfering with a good selection by the monotelephone. In fact the compensation is only approximate when different frequencies are used and is only exact for one given period, so that it is required to work with frequencies lying as near together as possible. These are chosen at 575, 725 and 875 for the transmitters and 500, 650 and 800 for the receivers of the same station.

Western Union Float in Denver Parade.

The accompanying illustration shows a float representing the Western Union Telegraph Company, which formed a feature of the recent industrial parade in Denver, Col. The globe was constructed of canvas drawn over a framework, eight feet in diameter, the western hemisphere being shown on both sides. On the North American continent Denver was represented as the central point from which lines radiated in every direction. The maps were executed in the company's standard colors, white and blue. The telegraph lines were shown in tinsel, and ropes of flowers outlined the float. At the four corners of the float were operators, each being provided with a set of instruments and a typewriter. They alternately sent and received messages while the parade was in motion. The four operators were A. F. Felder, E. L. Whitbred, A. Fried and M. E. Tierney.



WESTERN UNION FLOAT IN INDUSTRIAL PARADE, DENVER, COL.

We are indebted to Mr. J. C. Nelson, general superintendent, Denver, Col., for the photograph of the float and the facts given herewith.

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Instruction in Wire Patching.

BY B. D. SNYDER, DALLAS, TEX.

There has been much said and done for the improvement of the various departments of the telegraph service, but there is one department that does not appear to have received its proportionate attention.

Experience shows that there is a lack of interest taken in the instruction of young men and women, and some of the older ones, too, assigned to testing offices, in the matter of making tests and patches of the various circuits passing through such offices. At any time a wire chief may be called upon to test or patch a wire at any office in his jurisdiction. It is his duty to get defective circuits into workable condition, but when he has to deal with an attendant at a test office who does not know how to make a simple test or patch much valuable time is lost in giving detailed directions over a wire. It consumes anywhere from ten to thirty minutes to give such instructions, when the work should be accomplished in a few minutes.

I believe that a method of instructing those who are assigned to such offices in test and patch work would be a move in the right direction.

As a suggestion I might offer the following as one plan to meet the situation: Have a print made of a 20-strap board with the most numerous patches and tests shown on it, also a set of small illustrations showing how and telling why each one is made, and have them so numbered that a wire chief can direct the test office what test or patch to make simply by giving the number of the chart to follow. The charts and printed instructions should be kept beside the switchboard and the manager held responsible for them just as he is for other pieces of office property.

A Novel Cause of Wire Trouble.

Mr. R. H. Tudor, manager of the Western Union Telegraph office at Chattanooga, Tenn., reports an amusing case of wire trouble on a line between that city and Dalton, Ga.

One of the trunk lines became grounded and a lineman was immediately sent to clear the trouble. He found it just north of Dalton. A farmer living near the railroad had been experiencing considerable trouble with his mules and his wire fence. The mules were in the habit of rubbing against the fence, thus pushing the posts down and getting out on the railroad tracks. Being somewhat of an electrician the farmer tapped the wire and connected it to the top wire of his fence, in order that the mules might receive a shock, the idea being to thus keep them away from the fence.

When asked by the lineman what he meant by grounding the wire, the farmer replied: "I didn't know it would interfere with you fellers sending telegrams. I just merely wanted to protect my mules from the railroad." He promised, however, that he would string a barbed wire around his farm and "shock" his mules in a different manner.

[No doubt many curious experiences of this nature are met with throughout the country and if anyone knows of such we would be glad to have an account of them for publication as a matter of general interest.—Ed.]

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.

Fireproof Varnish for Insulation.—A French patent describes a fireproof varnish for insulation. A solution of cellulose acetate in tetrachlorethane and pyridine forms a substitute for rubber varnish for electric wires. Its viscosity can be increased if necessary by the addition of hexachlorethane or aldehydes of the terpene series. This varnish can be used for flame-proofing textiles and for insulating tinfoil in electrical condensers.

Ordering Literally.—In the printed circulars relating to word counters it is requested that customers mention, when ordering, the type of make of their machine. An order was recently received with the information that the type of the machine was pica, and he wanted a word-counter with attachment to fit the same.

Squirrels Housekeeping in Cable Box.—The circuits in a telephone cable in Great Barrington, Mass., became "noisy" recently. Investigation disclosed a family of squirrels in a cable box, the occupants having pulled off the insulation around the wires for their nest.

Electrical Assessments in California.—Among the assessments of electrical properties in California the telegraph is placed at $25,160.20 and the telephone at $399,594.74.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - - - *Publisher*
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
R. J. WEEKS, Manager Advertising Department.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

September 16, 1911.

Fire Drill in Large Telegraph Offices.

The Western Union Telegraph Company has inaugurated a fire drill in its large offices throughout the country and it cannot be questioned that this is one of the most important steps taken by the company for the protection of the lives of its employes.

In the event of a fire or any other cause for alarm where there are many people congregated, and they become panic-stricken, the loss of life which usually ensues is due very largely to the disorder resulting from the unorganized effort to escape from danger. It is generally recognized that the application of system and order in any line of activity produces the best results with the least amount of friction and loss of time. The same idea is applicable to the handling of human beings collectively as well as individually.

Regular training to perform certain acts under assumed emergency conditions, is the best means of preventing disorder and panic in times of actual emergency, and this is what is being done by the telegraph company. On a prearranged signal every employe in the room opens his or her key, stands attention and awaits orders from the division traffic chief. On order they all march to the exits and other places of safety. This is all done in an orderly manner, and everyone is enabled to escape with the least confusion and in the least possible time.

In the practice drills, signals call all hands back to their desks. In the New York office one floor of the main operating department has been cleared in thirty seconds and within one and a quarter minutes from the sounding of the first signal every employe was back to work. This is remarkably quick time for such an action, and it augurs well for those most deeply concerned in case an actual emergency should arise. The company is to be commended for its humane attitude, and it is to be hoped that this innovation will prove to be a case of an ounce of prevention being better than a pound of cure.

The Atlantic City Reunion of Old Timers.

In respect to attendance and enjoyment the reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps at Atlantic City on September 5, 6 and 7, was a great success, and the members, their families and friends have reason to regard their visit to this famous seaside resort on this occasion as a real "bright spot" in their lives. It would do us all good if we had more such "spots" in our experiences. Telegraphers, even those of the old time variety, are hard workers, and such outings are beneficial all around.

The mind requires variety of thought-food as much as does the body physical food, and a change of thought-food is as helpful to the body as is the other kind.

An interesting feature of the meeting was the presence of Mr. E. L. Morse, a son of the inventor of the telegraph, and the old timers naturally took particular delight in honoring this distinguished guest. The great achievement of his father is one of the most powerful agencies in the world to-day in uniting the widely separated peoples of the earth into one great family and contributing to their comfort and knowledge. Indeed, the reunion itself was an indirect result of Professor Morse's work, for if the telegraph had not been invented there would be no old or young timers, and no occasion to gather together as a united body representing one of the greatest industries in the history of the world.

An Effect of the Messenger Boy Law in Massachusetts.

An interesting situation has developed in Massachusetts as a result of the recently enacted law prohibiting the employment of messenger boys under the age of 21 after 10 p. m. While the telegraph companies are alive to their obligations to the public and to the provisions of the law, they have decided to curtail the delivery service after that hour in places where it does not warrant the necessary extra expense to carry out the legal requirements.

Messages received after that hour addressed to persons having a telephone on their premises can be forwarded to their destination by this means, but those which cannot be so dispatched may be held for delivery next morning.

Some means will undoubtedly be provided for the delivery of urgent messages at any time, whether the addressees have a telephone or not, for the idea of keeping a telegraph office open for the reception of messages and providing no means for their delivery would be rank inconsistency, and certainly the telegraph companies realize that. The law may be particularly onerous, but the telegraph companies will surely find a way to meet the situation and fulfill their obligations to the public.

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Causes of Losses in British Telegraph Operation.

In a recent speech in the House of Commons, London, on the subject of government telephone control and operation, Sir Herbert Samuel, postmaster-general of Great Britain, gave some of the reasons why the English telegraph system lost $5,000,000 a year.

"It has been stated," he said, "that the post office is not to be trusted with the management of this business (telephones) because post office inefficiency has been proved by the fact that our telegraphs are worked at a loss which now amounts to about £1,000,000 ($5,000,000) a year. The loss on the telegraphs is due to four causes.

"In the first place there are the low press rates which are quite unremunerative, and which were granted by Act of Parliament at the time of the transfer of the telegraph business to the state. These very low press rates account for a loss of about £200,000 ($1,000,000) a year, and it is sometimes amusing to read newspaper articles asserting that the inefficiency of the post office is proven—when the fact is that under parliamentary pressure we gave unduly low press rates—and that therefore the telephones ought not to be entrusted to our hands. These same newspapers are at the moment enjoying the unremunerative rates which they would be very unwilling to surrender.

"Secondly, we have deliberately extended the telegraph system in the rural districts for general purposes of national development in a way that a commercial company would not have done. It has been done with the sanction of Parliament and by various governments with their eyes open, knowing that a loss would accrue, but believing that it was well to spend some part of our postal surplus in incurring that loss rather than leave the rural districts unprovided with telegraphic facilities.

"Thirdly, when the telegraphs were on the point of paying their way, and when the earlier deficits were being made good, the House of Commons stepped in and rejected, a good many years ago, the advice of the postmaster-general of that day, and insisted on a system of six-penny telegrams which are in very many cases unremunerative, and which account for a considerable portion of the loss. But even six-penny telegrams might have been made to pay in the course of time, if it had not been for the intervention of the fourth consideration, namely, the development of the telephone itself, which has been actively fostered by the post office, and the effect of which has been to take away a most remunerative part of their business—the short-distance telegrams between different parts of the same towns.

"Telegraphy has completely altered its character in recent years. The bulk of the telegrams used to be telegrams dispatched short distances, but now the bulk of telegrams are becoming more and more telegrams which are sent over long stretches of the country, and which are not of a remunerative character at the six-penny rate. When the average cost of dealing with a telegram now as compared with twenty years ago is considered, you find that a telegram dealt with now is a different thing from what it was twenty years ago, owing to the advent of telephony. The fact that there has been a loss on the telegraphs is not due to inefficiency, but is owing to the operation of these four reasons.

"While the telegraph system does not pay, I think the House of Commons would prefer that there should be a loss paid out of the postal surplus than that either the press rates should be raised or that the country districts should be without facilities, or that the six-penny rate should be increased, or that the substitution of telephony for telegraphy should be hampered."

Telephone Dapartment at Buckingham Palace.

The telephone department at Buckingham Palace, London, the city residence of King George, has been remodeled and brought up to date. During King Edward's time this department was of the most primitive description, but King George appreciates the value of the telephone and uses it constantly, day and night.

The general post office has installed a special exchange in the palace with three fifty-line switchboards, two for day and one for night service. There is an extension from the switchboard to the king's private apartments, and in addition the king has a private exchange line of his own which is used for specially private conversations on affairs of state with cabinet ministers and high officials.

There is also a private wire to Windsor Castle and to the residence of Lord Knollys, Sir Arthur Bigg and other court officials, to Marlborough House, York House, the residence of the Duke of Connaught, and St. James Palace.

The most extraordinary precautions have been taken to prevent these private conversations from being overheard. The king's number, which is, of course, not made public, is "832 Westminster," but any one who expected to "get through to the king" by calling up that number would be disappointed.

Queen Mary, in addition to the same facilities, has a private line from her boudoir to the children's schoolrooms, and she, too, uses the telephone on every possible occasion. King George frequently gets through a lot of business on the telephone before he goes out at 9 o'clock for his ride in Hyde Park.

Delivery of Messages in Georgia.—The Georgia Railroad Commission proposes to adopt a rule requiring all telegraph companies to deliver day messages within one hour, if the addressee lives within the corporate limits of the town where the message is received, and all night messages by nine o'clock the following morning. The telegraph companies will be permitted to deliver such messages by telephone upon written request of the sender or addressee.

Standardization Rules.—The August transactions of the American Institute of Electrical Engineers contains the standardization rules of the Institute adopted June 27. The rules are very complete.

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The New Telegraph and Telephone Building in New York.

The site for the new building to be erected on Walker and Lispenard streets, New York, for the joint use of the American Telephone and Telegraph Company, the New York Telephone Company and the Western Union Telegraph Company, has been cleared and work is now progressing on the foundations.

The assignment of space in the building will be about as follows:

The Western Union Telegraph Company will occupy the eleventh to the sixteenth floors inclusive and half of the seventeenth floor, which will be used as a restaurant for the employes.

The American Telephone and Telegraph Company will occupy the third, fourth, fifth and part of the sixth floors, chiefly for the installation of its new long distance toll board. This will be the largest 'ong distance board in this country, having approximately two hundred operators' positions. Part of this board will be located on the fourth and the remainder on the fifth floor, the third floor being used as a terminal room.

The New York Telephone Company will use the remainder of the building for offices for the various departments.

The building has been planned with a view to meeting the requirements of the three companies for about eight or ten years.

While no local switchboard will be installed in the initial building, it is the intention later, when additional stories have been added, to install two or possibly three local switchboards which will be capable of furnishing service to approximately 60,000 stations.

It is proposed to finish the roof of the building in order that it may be used as a roof garden.

The building will have an ultimate height of twenty-four stories, but for the present only seventeen stories will be erected. The estimated cost of the initial building will be about $1,730,000, and it is expected to have it ready for occupancy about June 1, 1912.

A description and illustrations of the building were given in our issue of February 16.

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.]

(64) Q. Do all liquids conduct electricity to the same degree? A.

A. No; there is a vast difference. Liquids may be divided into three classes as to electric conductivity: First, those which do not conduct at all, such as turpentine, petroleum and many oils; second, those which conduct without decomposition, such as mercury and other molten metals which conduct as solid metals do, and, third, those which are decomposed when they conduct a current, such as dilute acids, solutions of metallic salts and certain fused solid compounds.

(65) Q. Does magnetism act through water, and is there any substance that will stop the magnetic lines from passing through? S. T. W.

A. Magnetic action takes place across glass, wood, paper, water and all other substances except iron. The magnetic lines are absorbed by the iron, and this fact is utilized in the construction of ammeters and voltmeters that are to be exposed to external magnetic fields. The iron case of the instruments protects the mechanism from magnetic influences outside of the case.

(66) Q. Is there any distinction between a magnet and a magnetic substance? B. A. M.

A. Yes, there is a decided difference. A magnet attracts only at its poles, but a piece of iron will attract either pole of a magnet, no matter what part of the iron is presented to the magnet. It has no fixed poles. The iron is therefore a magnetic substance.

(67) Q. Does change of temperature have any effect upon the output of a battery? D. C.

A. Yes. If a cell be warmed it yields more current than when cold. This is chiefly due to the fact that liquids conduct better when warm, the internal resistance being thereby reduced.

(68) Q. Is there any way to measure the strength of the distant battery in quadruplex operation? B.

A. In Jones's Pocket Edition of Diagrams there is a rule for measuring the strength of the distant battery, but the explanation is too lengthy to be given in this column. It will be found on page 63 of Mr. Jones' book.

(69) Q. In wireless telegraphy are received signals always of the same power? S. A.

A. No, they vary a great deal. Inaudible signals often become strongly audible in a few seconds. They may remain so for a few seconds and eventually die away. This phenomenon is called "swinging" and is supposed to be due to changing conditions of the atmosphere. A very interesting article on the effects of sunlight on wireless transmission was printed in our issue of September 1. It gives a great deal of information on the peculiar actions of wireless signals.

Mr. George F. Bassett of the commercial department of the Western Union Telegraph Company, Chicago, Ill., in a recent letter writes: "I want to take this opportunity of expressing my appreciation of the excellence of TELEGRAPH AND TELEPHONE AGE. It is certainly keeping up with the times in quality and in style and I do not see how any telegrapher or electrician who desires to progress in his profession can get along without it."

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Wireless Telegraphy and Aeroplanes.

The applications of wireless telegraphy are now so widespread that much progress has been made in directions which, in the ordinary way, receive but little public recognition. One of these applications is in telegraphing from aeroplanes and airships. The advantage of being able to communicate with land or other stations was well exemplified in the case of the Wellman flight, and the gain to a military aeroplane scout in being able to send messages to his army is obvious. With the aeroplane the weight of the apparatus is important. A long aerial wire, though a necessity where distances of any length have to be covered, is almost out of the question. Many experiments have been conducted with long aerial wires trailing behind an aeroplane, and distances of a few miles have been covered by that means. In experiments carried out with Mr. McCurdy's aeroplane in the United States only one long wire was employed, the steel wires of the machine itself being used as a counter-capacity. The idea of employing the network of wires on the aeroplane is, however, impracticable, as they become "alive," and might give serious shocks to the pilot or passenger. Two long wires appear to be the simplest solution of the problem, but trailing wires present dangers in so many ways to a machine travelling at a high speed through the air that pilots might rarely consent to their use.

In a lecture before the Royal Institution, London, Mr. T. Thorne Baker passed in review some of the work already accomplished in the application of wireless telegraphy to aerial navigation and referred to some satisfactory results obtained by Mr. Farman by using two trailing aerials, each consisting of rather thin wire about one hundred metres in length. Those experiments were carried out some time after Mr. Baker had adapted a similar arrangement to a Bristol biplane in England. In the latter case no loose wires were used, and thus he had been limited to the amount of aerial that could be attached to the machine itself—about fifty feet. Instead, however, of using balanced aerials, he coupled them to each end of an inductance coil, and increased their effective length to the greatest extent possible without sacrificing efficiency. In the latest form of the apparatus he was using a 6-in. induction coil with a ⅝-in. spark gap, fixed at a considerable distance from the apparatus, so as to be away from the petrol tank. Two light brass rods extended from the coil well into the space between the two main planes of the machine, and to one side of the tank, and two ⅜-in. brass rods sliding over these and ⅝-in. apart formed the spark gap terminals. Shunted across the spark gap was a condenser of the Leyden jar type, and an inductance coil consisting of seven turns of No. 14 copper wire wound on a light ebonite drum. This inductance had sliding contacts so that the number of turns used could be varied in the usual manner, in order to tune the two circuits. The two aerial wires were connected to the two ends of the inductance in use, and the aerial circuit was brought into tune with the shunt circuit. A secondary battery of eight or ten volts supplied the primary energy, about fifty or sixty watts being required.

Two new arrangements have since been adopted, which should greatly enhance the efficiency of the plant. The chief of these is a long light brass tube attached to, but insulated from, one side of the tail of the aeroplane. This acts as a counter capacity, or "earth," to a long aerial wire on the other side. This aerial starts from the nose of the machine, is carried thence to the extreme outer edge of the main plane, thence back to the tail, and thence to a loose extension, a length of sixty feet of copper wire trailing behind.

Much attention has been given to the problem of receiving wireless messages on aeroplanes. For an aeroplane scout to be able to communicate with his commanding officer is, of course, of primary importance, but it would be of immense advantage if he could exchange messages or receive commands. The chief difficulty is that of noise. A visible method of receiving must perforce be selected. Mr. Baker suggests an arrangement in which a coherer is fitted up to the aerials, with a tuning condenser shunted across it, and every two seconds the coherer is automatically decohered by a striker actuated by a magnet excited by a clockwork contact maker. A relay and battery are connected in series with the coherer, and the local circuit of the relay is connected with another battery and electric lamp. Each time a signal is received the lamp lighted up—for one second in the case of a dot and for two seconds in that of a dash. These long signals are obviously necessary, but in spite of that a message can be sent with reasonable rapidity.

An alternative means of receiving on an aeroplane is to use an inker, and this method again requires the employment of the coherer. The inking apparatus is heavy, however, and requires fairly careful adjustment, so that it is rather unsuitable for use where there is much vibration. The question of vibration is a serious one with the ordinary coherer, for if mechanical decohesion is very rapid, it might be impossible to make the coherer work long enough to get the local side of the relay to work effectively. The actual number of impulses per second in an aeroplane traveling thirty miles per hour, with a Gnome seven-cylinder engine, is on the average too great for the coherer to act. In that case it becomes necessary to employ an anti-vibration holder to take off the abruptness of the shock, or a coherer which is insensitive to the abruptness of the shock.

Wireless telegraphy from balloons and airships has reached a more satisfactory stage. Of first importance is the ability to suspend a long wire from the balloon, and next the weight-carrying capacity of the balloon itself. The apparatus used in the Beta military airship weighed roughly 100

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pounds and signals had been transmitted, under favorable conditions, a distance of about fifty miles, so that the ratio of weight to distance of transmission was roughly two pounds to the mile. An ordinary induction coil and accumulator had so far been used in the experiments and one trailing aerial wire and a counter-capacity. In the counter-capacity what was required was superficial area to take the electrical charge, and hence as light a substance as possible might be chosen.

The form of the future wireless outfit for airships would, Mr. Baker suggested, consist of a two-cylinder petrol engine coupled directly to an alternating current generator, the output of the latter being about two kilowatts, an aerial wire about 350 ft. in length, and a counter-capacity in the form of very thin metallic sheeting suitably disposed. Either a transformer for producing the high tension current and a zinc spark-gap or an arc transmitter would be employed.

Attention has been directed during the last few months to the production of portable apparatus. The chief limiting factor in small receivers is in connection with the detector. The vacuum valve detector of Professor J. A. Fleming will probably be the most suitable in many respects, and next to that an electrolytic detector.

QUESTIONS TO BE ANSWERED.

[The success which has attended our plan of publishing in each issue a list of questions covering the subjects considered in Jones' Diagrams, has encouraged us to maintain the work through other books. Students of telegraphy throughout the country are finding these questions of great assistance in their studies of the general principles underlying the operation of the apparatus with which they come in daily contact. Many consider this the best plan which has yet been devised for a systematic study of the technical side of the telegraph.. Having completely covered Mr. Jones' book we are now covering "The Quadruplex," by Maver and Davis, and will bring out, in a like manner, all the facts that every telegrapher should know about duplex and quadruplex telegraphy as found in this book.]

CHAPTER VIII (*Concluded*)

Does the insertion and removal of the various resistances from the line affect the total resistance of the quadruplex circuit?

What is the prime factor in obtaining the desired increase and decrease of current strength?

Why does a continuity preserving pole changer not work as well on a long line as on a short one?

Is the battery short circuited at any time when using the pole changer shown in Fig. 36?

In order to produce a difference of three to one in the strength of current which reaches the distant station what resistances should be used in the "added resistance" and the "leak?"

Is this margin sufficient for long circuits?

With a gravity battery how is the margin obtained?

In a battery of 300 cells, how many cells should be apportioned to the "short end?"

How is the margin in a quadruplex operated by machine currents varied?

In actual practice what are the values of the "added resistance" and "leak" resistance adopted to obtain a margin of four to one?

In the resistance box shown in Fig. 37 what is the effect of inserting plugs at L and R?

What means are provided to quickly open the circuits between the generating machines and the home instruments?

Referring to Fig. 38 what is the effect of turning the lever *B'* to the point *G*?

Why is the resistance of this connection made 600 ohms?

CHAPTER IX.

What are the essentials to secure successful operation of the quadruplex?

What is meant by intelligent handling of a quadruplex set?

How should the theory of the quadruplex be mastered and how should practical knowledge of its operation be obtained?

What is the "tap" or "tap wire"?

What is the effect on the current going to line of opening and closing the polechanger?

What is the "ground coil?"

What is the function of the ground coil?

What other name is sometimes applied to the ground coil?

What is the No. 1 relay?

What is the No. 2 relay?

What is the average internal resistance of a cell of battery?

What is the usual division of a battery on circuits of 100 miles in length?

By dividing in two portions what is the margin?

How is the margin widened on longer circuits, and what is the usual proportion of division on such circuits?

Why is it necessary to employ a wider battery margin on long lines than on short ones?

Two Kinds of Poles.—The manager of a telegraph office in examining applicants for positions as messengers asked one of the boys if he was not a Hebrew. The boy replied that he was not, but was a Pole. He was put to work, and the manager asked him later if he was a plain Pole. The boy replied that he was a plain Pole before he was hired, but since then he was a telegraph pole.

Copper Wire for South Africa.—Purchases will shortly be made by the Administration of Southern Rhodesia of copper telegraph wire for installation along the railway, the cost being estimated at $100,000. Considerable quantities of material will also be required for the installation of a metallic telephone system at Bulawayo in place of the existing single lines.

TELEGRAPH AND TELEPHONE AGE is the oldest and most ably-conducted telegraph journal in America and should be read by every one engaged in telegraphy. Subscription price, $2 per year.

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Advertising the Telephone.*

BY JOHN LEE.

The most impressive sight we saw in America was a meeting of the New York Telephone Society. In a large theatre of the Engineers' Club in New York,—a beautiful building given by Mr. Andrew Carnegie at a cost of "a million and a half or so"—something like 1,500 men, mostly young, were assembled. An admirable paper on the commercial work of the telephone company was given by one of the commercial managers. It outlined the methods employed in canvassing and advertising. It revealed the intimate psychology of the process. It showed how the weaknesses of our common human nature were taken into consideration, how the world was convinced of the absolute necessity of a telephone in business enterprise and in domestic relationships. Not all of that fine audience were on the commercial side of the tripartite functions. Some were plant engineers, some were traffic engineers, some were local managers and agents. But the very excellent society sets out to give each member an insight into the work and ways of branches with which he is not directly concerned. It is a worthy ideal. It broadens the vision and enlarges the interest. Yet it does not connote for a moment that there is any misapprehension as to responsibility. The reader of the paper had no anxiety lest anyone should argue that the work which he described should be attached to another branch.

The psychology of advertising has received much attention in America. Lectures are given in at least one of the universities on the underlying philosophy of the advertising art. The idea is that the subconscious mind is what Locke said of the mind as a whole,—*a tabula rasa*. On this virgin wax many impressions are received and we know nothing of them. We are storing up in our mental furniture a host of ideas. They concern pills, shirts, boots, literature, watches, motor-cars, and typewriters. Day by day the advertiser strengthens the impression; he "rubs it in." The patient subconscious mind accepts it all, and when the moment comes for revelation, the impression springs, a vivid reality, into open consciouness. We have a pain—we think of certain pills at once. We have an uncomfortable shirt—the subconscious mind whispers to us of so-and-so's ever-comfortable shirts. We are athirst for information—the intolerability of life without the "Encyclopædia Britannica" is at once evident. Here, therefore, we find the first canon of advertising. It must hammer home one central idea on the subconscious mind. It must not look anxiously for direct results. It will get the results in due course, but that is a second process, and belongs to what the philosophers call the "collecting" period, a word which has philosophic kinship with our word "re-collecting." Its primary idea is to gather up in the stores department of the human mind certain information which will be available at the moment of need.

So the advertising of the telephone is divided into two distinct propaganda. There is the general propaganda: the telephone is useful to everyone. It saves time and money, temper and trouble. It is an ever ready servant. It is quicker than the post and more trustworthy than a messenger. It is preciously intimate, the binder of broken friendships and the solvent of civilized isolations. Day by day such asseverations are made. Their truth is unimpeachable. But bald general statements do not "drive home." They need to be focussed into something of direct interest, and the prevailing sentiment of the hour is used to catch the public eye. One of the best of these efforts was at the time of the recent explosion in New Jersey. The buildings in New York had been shaken to their foundations. There had been grave public anxiety; so the telephone company came out with an excellent advertisement in the newspaper: "Thousands rushed to the telephone. Husbands were anxious about their wives. Wives were anxious about their husbands. In a few moments the business of New York went on as before, for the anxiety was allayed. Have you a telephone in your home?" It was part of the general propaganda, but it had special point by reason of the fact that it chose as a peg the topic which was in everyone's mind. That is the sound philosophy of advertising.

But a calamity is not always at hand, so a calamity is not always necessary to the general propaganda. In the middle of last winter one of the companies issued a very pretty and effective newspaper advertisement. The picture showed a very beautiful lady sitting in a dainty boudoir, with pianoforte and literature and needlework—and yet she was obviously lonely. The letterpress explained it. "Books, needlework, music—these are all very well to alleviate loneliness, but a woman longs for the sound of a human voice. She longs to speak of the intimate things. And then the telephone bell rings—'Oh, Edith,' she says, 'I am so glad you rang me up, for George is away, and I was so lonely.'" I feel sure that such an advertisement awakened a responsive echo in many a gentle heart in Morningside and Montclair. At least the impression would arise in the conscious mind on the next occasion of loneliness, and that, of course, is the real aim.

Efforts are made, with very considerable success, to use the seasons of the year as a basis. For example, in the middle of the Christmas shopping season we are told that Santa Claus uses the telephone to very good purpose. Advertisements of that kind were used by the New York Telephone Company in both 1909 and 1910 respectively. When holiday season comes round a picture is given of the business man away at the seaside controlling his affairs in New York. Similarly, it is claimed that in the hot weather nothing is so successful as a telephone in grappling with the inconveniences of the heat, just as it was argued six months before that in cold and frost and snow the telephone was altogether indispensable. The small boy on July 4 is shown twining a telephone wire amid his fireworks. The lawyer is shown golfing; the physician is motor-

*Extracts from "The Postoffice Electrical Engineers' Journal," London.

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ing for pleasure; the political leader is a hundred miles from home, or a thousand, and all of them are kept in touch by the telephone. Singularly few of these advertisements deal with business proper in any form. This is left for the particularized method of circulars and personal canvass, and it almost resolves itself into a propaganda for the private branch exchange. The truth is that the day has long gone by when the utility of the telephone, in respect of business, needs any demonstration. It is rather the social side of life nowadays which calls for the public appeal. Hence it may be said that more than half the advertisements make their appeal to women rather than to men. It is not due solely to the fact that the United States is pre-eminently a woman's country, though this is beyond dispute. Rather it is that the next field to be conquered is that in which woman is specially triumphant.

Apart from general calamities there are particular emergencies in which the telephone is especially useful. With cunning art these are made the basis of alluring advertisements. One of them represents a business man who is invalided, conducting his business by telephone as he lies abed. To most of us this might be a positively repelling appeal, but the fact is that it is a particular utility which is highly esteemed by our cousins. The great railway king, Harriman, may almost be said to have died with the telephone in his hand. Another series of pictures deal with illness in the home. We see the boy, ill of scarlet fever, lying on his bed, with his mother in attendance. She is a prisoner, of course, but by her side is a telephone, and her smiling face as she uses it shows that it has had some influence in relieving *tedium vitae*. Other pictures of invalids show us the victims with wearied faces and usually dressed in elaborate dressing-gowns, but in all cases the telephone is their salvation. Burglaries form topics of a lurid type. The Philadelphia company issued one particularly thrilling picture. It represented a burglar, pistol in hand, mask on countenance, dark lantern by his side. With indignant scorn he is regarding a telephone. "It ruined my business," he is saying. Another picture on the same subject shows us the policeman arriving in the nick of time, while a third shows us comprehensively how every wild alarm meets its destruction in the telephone. Fire-engines are shown tearing along the roadway as a result of a telephone call, and houses, barns, and warehouses on fire form the frequent subject of illustration.

There is sound reason behind this clever advertising propaganda. To begin with, the telephone is the only article of commerce which is qualitatively of more value with the quantitative extension of its use. It is not of much value to me that 29,611 other people should get an "Encyclopædia Britannica," beyond the bare material fact that it enables me to get one cheaper. Nor do I care a straw whether the people in my suburb do or do not have the electric light, save that by an extension of users the price may be reduced. Nor am I anxious that the world should use the back-ache pills which give me such wonderful relief, or the bread-nuts or the cocoa which in time will build my muscle to the pitch of Hercules and my brain to the pitch of de Morgan. Hence (having myself succumbed), the advertisements for the "Britannica," or the backache pills, or the bread-nuts or the cocoa excite in me no feelings whatever. But I do want everyone else to have a telephone, since my own use is qualitatively more valuable with every new subscriber. Hence the advertisements lead me to the reflection that they are in my own interest. The more alluring they are the better the telephone subscriber likes them, and the more likely the non-subscriber is apt to like them. Moreover, it is possibly quite true that the alert mind which has led a man to be a telephone subscriber somewhat in advance of his fellows is evidenced also by his superiority in appearance. I do not think, therefore, that the American companies are exaggerating when they show that the telephone farmer is in advance of his non-telephone rival both in respect to the modernity of his braces and the comeliness of his wife. He is manifestly a thoughtful and enterprising man, and he has a wife (and braces) suited to his condition.

Should we advertise in England? In my opinion the answer is, Yes. I doubt if Englishmen want the death-bed telephone or the scarlet fever brand. At any rate I should not recommend advertising in that way. But I am sure that the psychology of advertising deserves careful study from the telephone point of view in order that it may be applied with due regard to English characteristics.

Effects of English Strike on Telegraph and Telephone.—During the recent strikes in England many railway and other telegraph and telephone lines were cut. The pressure on the telegraph service of the country was unprecedented. Great numbers of messages which would ordinarily have been sent by post were entrusted to the telegraphs. The operating staff, both in London and in the chief provincial centres, worked under severe pressure, but responded with the utmost readiness to the calls made upon them. The telephone service on the trunk system during the railway strike was phenomenally heavy. Calls poured into London from the seaside resorts and provincial centres from early morning to late evening, and the value of the telephone in such a national crisis was realized more than ever before.

New Insulating Material.—A new insulating material has been patented in England by W. J. Reid. Paraffin wax is treated with a mixture of from forty to sixty parts of finely powdered cork and from sixty to forty parts by weight of boiled linseed oil, for such a time that it becomes viscous and will draw into threads when becoming cool. This mass can be molded while hot into any desired shape.

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Use of the Air for Wireless Telegraphy.*

The air is free to all, or, at any rate, it has been thought so until discussion upon wireless interference has become of importance. Now we have the knowledge that in England a license fee is charged, for the use of the air presumably, whenever a wireless station for transmitting is installed. Many bills on the same subject have been proposed in America, but up to the present time without result.

There is, moreover, some justice on the part of those who wish to limit the use of the air in this way. Since the loudness of signals depends upon the power of the transmitting instruments and the distance to be covered, it is possible for private persons and commercial companies to monopolize the space in certain vicinities, so that a most important government message cannot be received. It is, of course, to be understood that the government should have right of way, not only in the roads, but in the air.

Interference may be of two kinds, unintentional or malicious. In their effect there is no difference; but, as a matter of fact, it is the unintentional interference of experimenters unversed in the code, and without adequate breaking-in systems, that has given rise to most of the legislation hostile to them. Malicious interference either on the part of an experimenter or, as frequent complaints bear witness, on that of commercial stations, should be dealt with as severely as possible. It would seem that license restrictions would be too mild a treatment for such cases, and in all probability a method of dealing with them will be evolved.

In cases of unintentional interference, there is usually no remedy, as it is by an experimenter, or where the station is not properly equipped. No person should operate a transmitting set until he has a proper understanding of the codes, and, if he has no breaking-in system, without listening-in frequently to learn whether other stations are trying to make themselves heard. It is while a station is trying to receive messages from a distant source that interference is most objectionable. While a powerful station nearby is sending, a sending station of less power or different wave length may send without troublesome effect; but when it is trying to get signals from a weaker station, or one at some distance, the experimenter's interference will be most effective and most disastrous.

There are, however, some methods of overcoming interference. If the experimenter will use an oscillation transformer for sending, he will be able to tune his apparatus much more sharply. With a sharply tuned wave length, he will be received only by apparatus tuned in with his instruments most exactly. Therefore, if he is from fifty to one hundred meters either above or below the commercial station, he may be tuned out without trouble at the receiving instruments.

*From Wireless Operator's Pocket Book of Information and Diagrams, by L. W. Bishop

Another method of overcoming interference is by the new duplex system of wireless, where two aerials are used, one for sending and the other for receiving. The shorter aerial is for sending, thus ensuring a short wave length, much below that of the commercial stations. The longer aerial, for receiving, may be as large as is desired or needed, according to the distance to be covered.

Still another method is by the use of a breaking-in system, which will enable the experimenter to hear distant sending stations when they call, even while he is sending.

Where interference occurs with the government or commercial stations, a weeding-out or third (tertiary circuit) should be used. This will make the tuning of the receiving instruments twice as sharp as with the ordinary receiving loose-coupled transformer.

Operating and Testing Manual.

"Electrician's Operating and Testing Manual" is the title of an excellent book by H. C. Hortsman and V. H. Tousley, giving 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 telegraph and telephone engineering. A careful reading and study of the book will give one a comprehensive knowledge of electrical application in all branches outside of telegraphy and telephony. It is free from higher mathematics and the facts given are easily understood, the language used in explaining them is so clearly stated. Every telegrapher should familiarize himself with the various applications of electricity and this work will help him acquire that knowledge. The book is bound in flexible leather covers, and is sold at $1.50 per copy. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, for copies of this or any other book on electrical subjects.

Massachusetts Messenger Boy Law.—A recently enacted law in Massachusetts prohibits the employment of messenger boys under the age of 21 years after 10 o'clock at night. It is stated that in Worcester conditions are such that the telegraph companies do not feel warranted in employing men at the wages demanded to carry the few telegrams, or do the errands that may be offered after that hour. Telegrams received after that hour therefore may not be delivered until the next morning, unless the addressee can be reached by telephone.

A Little Mixed, but It Got There.—A telegram was received recently in a large city office addressed to the "Cattle Rangers' Cuttle Rye Co.," but before it was forwarded to its destination it was revised and sent to the "Cattaraugus Cutlery Co."

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INDUSTRIAL NEWS.

Composite Telephone Set.

The composite telephone set shown in the accompanying illustration is in extensive use where additional wire mileage has been required, and yet the expense of stringing the additional wires themselves was not warranted. For such cases, 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

FIG. 1.—PORTABLE COMPOSITE TELEPHONE SET.

the absence of outside construction simplifies the maintenance problem. Signaling with a composite telephone, it is claimed, is infinitely more effectual than with the telegraph.

The signaling apparatus used with the set calls between stations by means of what is known as a howler. When one operator wishes to call another

FIG. 2.—COMPOSITE TELEPHONE SET.

he presses a button in the side of the telephone set. This action automatically starts an interrupter working, which sends out high frequency signaling current over the line and causes the howlers at the other stations to give the desired signal in a loud whistle or shriek.

No change in the telegraphic apparatus or its operation is necessary to adapt the system to telephone operation as well. Each telegraph station is merely bridged with a condenser and a resistance and the telephone apparatus is connected between the line and ground. A condenser in each telephone set prevents the telegraphic current from passing through this apparatus to ground.

It is said to be easily possible to talk on a composited line of this character while telegraph signals are passing over it, without any interference whatever. This apparatus is manufactured by the Western Electric Company.

Portable Testing Battery.

The portable testing batteries manufactured by E. Marcuson, of 136 Liberty Street, New York, although constructed on unconventional lines, have proved thoroughly practical, as is evidenced by the fact that during the past two and one-half years they have been adopted by such prominent corporations as the Postal Telegraph-Cable Company, the Interborough Rapid Transit Company, the New York Edison Company, the United Electric Light & Power Company, and many other electrical concerns.

Several small storage cells are assembled in boxes to form batteries of any desired voltage. At present, four standard sizes are carried, viz.: 100-volt, 140-volt, 168-volt and 256-volt batteries, their weights being 17½, 24½, 29 and 42 lbs., respectively. The illustration shows a man carrying a 100-volt and a 500-volt battery.

These batteries are used principally in insulation and capacity testing, calibration of instruments, potentiometer work, etc., but owing to the low internal resistance of the cells, their field of use is

PORTABLE TESTING BATTERY.

very wide compared with that of the usual type of testing battery. The battery is serviceable for testing the continuity of the wires and fittings of an installation before the main current is available by using an incandescent lamp for the indications.

As a further example of the flexibility of these batteries, it is pointed out by the manufacturer that on a recent occasion the line tester of a cable com-

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pany was able, by means of his 100-volt battery, to actually maintain telegraphic communication during several hours, which result was, in this particular instance, of inestimable value.

A noteworthy feature of these batteries is that, although the various parts are visible, accessible and removable, they are of a portable nature.

Telephone Train Dispatching on the Nickle Plate.—The Nickle Plate Railroad has recently ordered of the Western Electric Company a complete telephone train dispatching equipment for its Buffalo division. This circuit will be 116 miles in length, and will extend from Buffalo, N. Y., to Conneaut, Ohio, where the train dispatcher will be located.

Telephone Train Dispatching on the Duluth & Iron Range Railroad.—The telephone system of train dispatching has been installed on the Duluth & Iron Range Railroad, between Two Harbors and Ely, with a branch from Allen Junction to Virginia and Eveleth, in Minnesota. The new system covers 123 miles and there are fifteen way stations. The equipment of telephones and selectors was manufactured by the Western Electric Company.

Electrical Code.—The Electrical Code of the City of New York for 1911 is a very comprehensive book of 212 pages and covers every electrical application. It comprises the rules and regulations for the construction, care, maintenance and operation of ducts, poles, conductors and other electrical appliances in the streets, public places and public and private buildings in New York City. The telegraph, telephone, wireless telegraph, etc., are thoroughly covered. The book is issued by the Department of Water Supply, Gas and Electricity, for which Professor George F. Sever is consulting electrical engineer, and copies may be obtained free of cost.

School of Telegraphy in Mexico.—A school of telegraphy will soon be opened in Mexico City, which will have for its aim not only the teaching of telegraphy, but also of electrical science, the construction of apparatus, and many other useful branches which will give the students a diversity of knowledge, so that they will not be confined to the telegraph operator's desk. A correspondence school will be maintained, so that students all over the Republic can have the benefit of this new institution. Ingeniero Carlos Islas Bustamante has been appointed superintendent of the school and he is securing competent professors in the various departments preparatory to opening the school at an early date.

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 book is issued in two styles of binding, cloth and red morocco, the prices per copy being 25 and 50 cents, respectively. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Concrete Poles.

Mr. Frank C. Perkins contributes an article to the *Electrical Review and Western Electrician*, describing the construction of modern American concrete pole lines, from which the following extracts are taken.

A pole thirty feet in length will permit a deflection of thirty inches before the concrete cracks.

Even under tremendous strains the cracking of the cement, it is held, does not impair the strength of the pole in the least, for after this takes place the reinforcement becomes active and takes the entire strain; and as the special rods are guaranteed to withstand a breaking strain of 50,000 pounds per square inch, it is an easy matter to understand why this class of construction has two or three times the strength of cedar.

Rods are placed within three-quarters of an inch of the surface of the cement at the corners and then bound together by a spiral wire encircling the four rods from top to bottom. This not only serves to tie the rods together, but prevents danger of the cement shearing off, as the rods have a tendency outward when the pole is subjected to a lateral strain. Another important function performed by the spiral binding wire is that it ties the concrete together and increases the flexibility of the entire body.

The smaller poles, up to and including thirty-five feet in height, are molded lying on the ground, and after they have been seasoned are set in place by means of a gin pole. The forms are laid with the butt near the hole and the reinforcement placed. Then the concrete is poured in and allowed to remain three to seven days, according to the weather. The forms are then removed so that they can be used again and the pole is held to season. This process requires about three to four weeks, and the poles are then ready to be set and used.

Poles forty feet in length or larger should be built standing, as this is the most economical method. First the hole is dug, and then the form is set in place directly over it, lined up straight and perpendicular, and temporarily guyed so as to hold its position. The spiral binding wires are then put in place and the rods drawn up on the inside of the form and set. After the reinforcement has been properly secured, the side of the form that was left out to receive the steel work is put in place and the bands or ties around the outside secured. The equipment is then ready to receive the concrete pouring.

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Atlantic City Reunion of Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps, September 5, 6 and 7.

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, under the most favorable conditions, and in point of attendance and enjoyment was the most successful meeting ever held by the two societies. The weather was delightful and the health-laden air, for which this famous seaside resort is noted, brought back to many of the old timers the enthusiasm and buoyancy of their younger days, and the Atlantic City reunion will long linger in their memories as one of the pleasantest events of their lives.

There was an attendance of 300, and a most enjoyable time was had by all. The meeting of old friends socially and the making of new ones afforded unbounded pleasure to all, and business cares were for the time being flung to the winds.

Nothing was left undone by the committees of arrangements and entertainment toward the enjoyment of the members and their families, and these committees deserve much praise for the able and successful manner in which they carried out their arduous duties. The visitors did not have any time hanging on their hands; there was an abundance of entertainment provided.

A pleasant feature of the reunion was the attendance of Mr. Edward Lynn Morse, of Stockbridge, Mass., son of S. F. B. Morse, inventor of the telegraph, and the old timers were particularly delighted at having an opportunity to meet an immediate member of the distinguished inventor's family.

Among other prominent telegraph men present were Mr. Stephen Dudley Field, also of Stockbridge, Mass., the well-known inventor and nephew of the late Cyrus W. Field; Messrs. David Homer Bates, C. A. Tinker and James Merrihew of New York. Another veteran was Mr. Daniel S. Robeson, an old-time line constructor. This was the first reunion that Mr. Robeson had attended. He met many of his old telegraph friends and seemed to enjoy every moment of the time spent with them.

The Society of the United States Military Telegraph Corps celebrated the fiftieth anniversary of the foundation of the corps by appropriate ceremonies.

The business meeting of the Old Time Telegraphers' and Historical Association was called to order promptly 10 o'clock a. m. on Tuesday, September 5, in Park Avenue Hall of the Marlborough-Blenheim Hotel, fully two hundred and fifty members being present.

Mr. David Homer Bates of New York, in appropriate remarks, installed the incoming president, Col. William Bender Wilson, of Holmesburg, Philadelphia, by pinning the Morse daguerrotype portrait on the coat of the new president.

President Wilson then introduced Mr. Alfred J. Royer, representative of the mayor of Atlantic City, who greeted the Old Time and Military Telegraphers and bade them welcome to the city by the sea. He also extended the freedom of the city to the members and their friends, and he expressed the hope that their stay would be a most enjoyable one.

Mr. M. J. O'Leary, of New York, responded to the welcome of the city in a very interesting address.

The reports of the secretary and treasurer, Mr. F. J. Scherrer, of New York, were then read, both of which showed a very satisfactory condition of the association's affairs. The treasurer reported a balance of $1,012.75 on hand.

Mr. J. H. Shearer, of Elmira, N. Y., made a motion to the effect that it would be to the best interest of the association to make every effort to increase the membership, and he thought each member ought to pledge himself to secure at least one new member during the coming year.

The Committee on Time and Place reported in favor of Jacksonville, Fla., as the place of the next meeting, the time to be the second week in October, 1912. The committee also recommended Honorable W. S. Jordan, an old time telegrapher and mayor of Jacksonville, as president; Paul R. Wiggs, of Jacksonville, Fla., a former telegrapher; H. C. Worthen, general superintendent, Western Union Telegraph Company, Atlanta, Ga., and George H. Usher, general superintendent, Postal Telegraph-Cable Company, Atlanta, Ga., vice-presidents, and Franklin J. Scherrer, secretary and treasurer; M. J. O'Leary and G. W. Logan of New York, auditors. The report was unanimously adopted.

Mr. E. P. Griffith of New York, chairman of the Turner Monument Fund, submitted the following:

"Your Committee, appointed to raise a fund for the erection of a monument with suitable inscription commemorative of the first railroad train order issued by telegraph, from the New York and Erie Railroad station at Turner (now named Harriman), N. Y., by Charles Minot, in 1851, then general superintendent of the New York and Erie Railroad, begs to report that a sufficient fund has been raised to provide a tablet under the plans agreed to by your committee, and that through the generosity of Mrs. E. H. Harriman, in kindly and cheerfully contributing the stone and expense for cutting the same, and also through the co-operation and generous aid of the Erie Railroad Company in providing a very suitable site for the monument, we are able to report that the dedication will take place late in October or early in November of the current year.

"While your committee has sufficient funds in hand to carry out the original plans, it has been wisely suggested that we elaborate on the tablet design and for that purpose further contributions are respectfully solicited.

"Your committee is greatly indebted to Mr. David Homer Bates for valuable suggestions and recom-

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mends that he be made a member of this committee.

"It is the intention of the Association of Railway Telegraph Superintendents, who are jointly interested in this project, to send a large delegation to attend the dedication ceremonies, and it is recommended that the president of this Association confer with the president of the Association of Railway Telegraph Superintendents, and appoint a joint committee for that purpose, due notice of the date of the dedication to be sent to all members of such joint committee by the chairman of the standing committee."

The report was signed by the full committee and was unanimously adopted.

The convention then adjourned.

The Society of the United States Military Telegraph Corps met in business session at 8 p. m. Tuesday, Colonel William Bender Wilson presiding. After the completion of the roll call by Mr. David Homer Bates, of New York, secretary of the society, he read the names of the twenty-five members who had died during the previous twelve months.

The report of the secretary and treasurer was then accepted, and President Wilson delivered his annual address, which was listened to attentively.

Colonel William Bender Wilson was re-elected president of the society, W. L. Ives and Charles A. Tinker, of New York, first and second vice-presidents, respectively, and David Homer Bates of New York secretary and treasurer.

President Wilson appointed as members of the executive committee the following: Col. Robert C. Clowry, New York; William R. Plum, Lombard, Ill.; Col. Albert B. Chandler, New York; William J. Dealy, New York; Charles A. Tinker, Brooklyn, N. Y.; Richard O'Brien, Scranton, Pa.; John Wintrup, Philadelphia, and Marion H. Kerner, New York. An auditing committee, consisting of Charles A. Tinker, M. H. Kerner and W. J. Dealy of New York, was also appointed. The Committee on Congressional Action consists of A. A. Zion, of Indianapolis, Ind.; E. Von Eye, Crowley, La.; M. F. Robinson, Sanford, Fla.; Frank B. Knight, Dallas, Tex.; R. H. Bohle, St. Louis, Mo.; Ten Eyck Fonda, Omaha, Neb.; and J. J. Fowler, New Orleans, La.

Mr. C. A. Tinker of New York addressed the meeting at some length regarding the dedication of a monument to Edwin M. Stanton, at Steubenville, Ohio, and eulogized the war secretary in glowing terms.

The meeting then adjourned.

THE ENTERTAINMENT.

The official entertainment comprised six events, and each and all were highly enjoyed and appreciated.

On Tuesday there was a roller chair trip, starting from the Marlborough-Blenheim at 2 p. m. There were over 100 chairs in the procession. Mr. C. B. Wood was chairman in charge.

At 8.30 p. m. Tuesday the party attended an excellent concert and entertainment on the Steel Pier, and thoroughly enjoyed the fine music. Mr. Marion H. Kerner, of New York, was chairman of this function.

On Wednesday at 9 a. m. the party took trolley cars to the inlet, where they boarded sailboats and enjoyed a sail on the Atlantic Ocean. As no wireless equipment was provided, no one ventured out of sight of land. Mr. J. A. McNichol of Philadelphia was the skipper, and he managed the affair well.

At 2 o'clock Wednesday all hands were taken on a trolley ride to Ocean City. This was a most enjoyable trip in the fresh cool air. At 8 o'clock the members and their friends attended a concert and theatre entertainment on the Million-Dollar Pier. Mr. M. J. O'Leary of New York was the chairman of this event.

During the day on Thursday the members were free to do as they pleased, and fully two hundred and fifty of them spent most of the day in bathing in the Atlantic. At 6.30 p. m. the banquet was held at the Hotel Shelburne and an excellent menu was provided. Addresses followed the dinner and a thoroughly good time was enjoyed by all present.

The dinner was pleasantly interspersed by the singing of songs, beginning with the national anthem and ending with Auld Lang Syne.

The after-dinner addresses were as follows: "Morse and the Telegraph," by Colonel W. B. Wilson; Mr. Edward Lynn Morse spoke of his father's work and stated that he was at present engaged in the preparation of manuscript for a book which will contain his father's letters; "Carnegie and the Telegraph," by David Homer Bates; "Our Reunited Country," by J. E. Graybill; "The Telegraph in War," by W. L. Ives; "Comrades," by Richard O'Brien; "Fraternity," by M. J. O'Leary.

The ode to Morse, by Marion H. Kerner, was sung to the air "My Maryland."

NOTES OF THE CONVENTION.

When Colonel W. B. Wilson got up to open the banquet he found himself speechless, having left his speech in another coat in his room in an adjoining hotel. Being a man of resource, however, he soon "found" himself and the rest of his work was plain sailing.

Mr. J. J. Ghegan, president of J. H. Bunnell & Co., New York, distributed snapper sounders which were heard all over town during the three days of the convention. He also gave those present self-winding tape measures in celluloid cases. These were much appreciated by the fortunate recipients.

Mr. M. J. O'Leary, secretary of the Telegraphers' Mutual Benefit Association, made many friends for the worthy society he represented. He has the welfare of the association at heart, and his efforts should be enthusiastically supported.

Senator W. L. Ives is entitled to a high place in the "humorist" class. His speech at the banquet caused the greatest possible amusement, and everyone was convulsed with laughter. The funny part of it is the Senator does not realize that he is funny.

Among the forty-niners present were Nathaniel Hucker, of Buffalo; J. A. Sutherland of Englewood, N. J., and James Merrihew, of New York.

Mr. Charles A. Keck, of New York, the sculptor of the Turner Monument, was a guest at the ban-

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quet and made many friends. He was plied with many questions regarding his work on the monument.

Mr. G. W. Deetz, of Atlantic City, a member of the executive committee of the Old Timers' Association, is entitled to the greatest of praise and commendation for his successful work in connection with the entertainment of the members. He was here, there and everywhere attending to the wishes of the visitors and ministering to their wants. The ladies and members of the various committees also deserve great credit for their efforts toward making the visit as enjoyable and comfortable as possible and their devotion to the cause won for them many friends.

Mr. Stephen D. Field went to Atlantic City to have a good time and become a boy once more, and he carried out his programme both in letter and spirit. His mind was as free from thoughts of quadruplexes and bug catchers as is that of a new-born babe.

A very handsome and artistic badge was worn by the members. On the upper section was represented a female figure in bathing costume reclining on the ocean beach, surrounded by various articles symbolic of the sea. A band across the face of the design bore the words "Atlantic City, 1911." The lower portion, which was pendent from a blue ribbon, consisted of a wreath surrounding a circular band in blue enamel, on which were the initials of the two associations—O. T. T. & H. A.—U. S. M. T. C. In the centre was the design of a telegraph key. The badge was made of heavy metal in imitation of oxidized silver and will be highly prized as a souvenir.

Among those present were the following:

Asbury Park, N. J.—C. R. Zacharias and wife.

Atlantic City, N. J.—Mayor Carmony, T. W. Wilson and wife, G. W. Deetz and wife, Judge Cole and wife, W. M. Phillips and wife.

Bridgeton, N. J.—Mr. and Mrs. Mulford, Sr.

Buffalo, N. Y.—N. Hucker, L. M. More and wife, Jos. Anderson.

Chicago, Ill.—John S. Henderson, Jack Magill and wife, F. M. Randolph and wife, Mrs. M. K. Holligan and Miss Kendrick.

Chattanooga, Tenn.—R. C. Jones and wife.

Claverack, N. Y.—James Merrihew, wife and niece.

Cleveland, O.—O. F. Stow, wife and son.

Detroit, Mich.—Roderick M. Ross and daughter, Richard H. Dunphy, James Moxam and wife, Alfred Lowther, wife, son and daughter.

Elmira, N. Y.—J. H. Shearer and wife.

Englewood, N. J.—J. A. Sutherland and wife.

Brooklyn, N. Y.—Thos. J. Cusack, wife, daughter and niece, Chas. A. Tinker, F. E. Coyle and wife, John B. Sabine and wife, V. J. Knittle and wife.

Freeport, Pa.—F. Kerney and wife.

Jersey City, N. J.—J. Flugauf and wife.

Jersey Shore, Pa.—H. W. Wedge.

Johnstown, Pa.—Peter Weitz and wife.

Monroe, N. Y.—J. B. Bertholf.

New York, N. Y.—F. E. McKiernan, Miss R. McKiernan, D. F. Mallen, Miss M. Mallen, J. M. Quill. D. H. Bates and wife, J. B. Taltavall, wife and son, Mrs. John Brant, Miss Josephine Allen, Henry Zweifel and wife, Miss P. C. Kuenstler, Miss M. Zweifel, Miss Eugenie Allen, H. W. Dealy and wife, Mrs. Marguerite C. Gates, John J. Ghegan, Edward L. Cohn, wife and daughter, Frank Kitton, Wm. Finn, A. M. Lewis and wife, R. J. Murphy, wife and daughter, F. D. Murphy and wife, J. F. McGuire, wife and son, L. Dresdner, Wm. Holmes, Wm. L. Ives, F. J. Sheridan, F. J. Scherrer, wife and daughter, M. H. Kerner and wife, M. J. O'Leary and wife, Mrs. Saml. F. Rice, W. B. Wood and wife, C. W. Parson and daughter, E. M. Mulford, Jr., wife and daughter, M. Green, wife, daughter and son, John A. Hill, A. Winder and Mrs. Fitzpatrick, J. H. Flood, P. A. Hickey and wife.

New Haven, Conn.—J. W. Ladd and wife.

Omaha, Neb.—Ten Eyck H. Fonda.

Pittsburgh, Pa.—J. A. Watson, J. W. Yealy, wife and daughter, F. J. McKenna and wife, D. Kelly and wife, W. K. Mellor and brother, W. I. McQuown, wife, daughter and sister-in-law, A. C. Terry and wife, Wm. Allenbaugh, wife, two daughters and son, T. E. Moreland, Virginia E. Moreland, Miss Jane L. Collins, Miss S. R. Haney, Miss L. J. Duncan, Miss M. H. Collins, John F. Amend, Jr., and sister, Mrs. F. J. Goersch, John Wentz, Charles R. Stough, W. R. Smith and wife.

Philadelphia, Pa.—John Wintrup and wife, Dan S. Robeson, E. L. Maize and wife, Andrew G. Wallace, Miss Jane S. Wallace, Miss Helen R. Sterrett, J. W. Crouse and wife, Sheldon Custer, John W. Benckert and wife, W. T. Westbrook, F. E. Maize and wife, E. H. Locke, M. Pease and wife, W. B. Wilson and wife, R. J. Meigs, A. S. Weir, W. W. Donnelly and wife, W. H. Butler, I. D. Maize, R. C. Murray, Jos. E. Janney and wife, J. M. Creamer, S. S. Garwood, J. W. Reed, R. C. Murray, W. E. Vanarsdall, Frank R. Webb and wife, Geo. Merrihew, L. L. Lutz, J. S. N. Phillips, A. G. Strickland, John H. Wilson, John Chattman, J. A. McNichol and wife, S. R. Crowder, C. B. Wood, C. E. Bagley.

Greensburg, Pa.—Miss Elizabeth Cogley.

Newburn, N. C.—Geo. Henderson.

Ottawa, Can.—G. F. Macdonald.

Passaic, N. J.—E. P. Griffith.

Paterson, N. J.—Chas. H. Snyder, wife and daughter.

Rochester, N. Y.—G. M. Case, wife and daughter, J. K. Parsons and wife.

Springdale, Pa.—Mrs. L. C. Adams.

St. Paul, Minn.—W. Weisel and wife.

Saginaw, Mich.—Wm. Henderson.

Stockbridge, Mass.—Stephen D. Field, Edward Lynn Morse.

Scranton, Pa.—Richard O'Brien and wife, Dr. J. E. O'Brien and wife, R. H. O'Brien and wife.

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Trenton, N. J.—W. H. Wilmot and wife.
Vineland, N. J.—M. M. Prescott.
Washington, D. C.—Harry McKeldin and wife, Mrs. Wm. J. Bodell, W. S. Royer, wife and daughter, J. W. Collins, Mrs. H. F. Taff.
Wilkinsburg, Pa.—T. S. Fleming and wife, Miss Carrie Good, S. M. Geary and wife.
Winsted, Conn.—C. K. Hunt and wife.

THE NEW PRESIDENT.

William Spencer Jordan, the new president of the Old Time Telegraphers' and Historical Association, is a former telegrapher and is now mayor of Jacksonville, Fla. Mr. Jordan is a native of Florida, and has lived in that State all his life. He was born at Quincy, Fla., August 5, 1853, and began his telegraphic career at that place in October, 1869. From that time, until 1902, he served as railroad agent and operator at various places

HON. W. S. JORDAN,
of Jacksonville, Fla., President Old Time Telegraphers' and Historical Association.

in his native State, and, he says, "never missed a month's pay." In 1902 Mr. Jordan moved to Jacksonville where he has resided ever since. He is a man of force and commanding appearance and is very popular in that enterprising city. As its chief magistrate he is giving the city an administration that its best citizens are proud of.

Mr. Jordan is now engaged in the insurance business in Jacksonville, but, like the majority of old time telegraphers, he keeps in close touch with things telegraphic.

Morse and the Telegraph.

In his address on "Morse and the Telegraph," at the banquet of the Old Time Telegraphers' and Historical Association and Society of the United States Military Telegraph Corps, at Atlantic City, N. J., September 7, Col. W. B. Wilson, president, said:

"The effect on and the value to social advancement of that invention [the telegraph], which has penetrated and influenced all lines of human endeavor, is worthy the study of the sociologist. In its pursuit he will find that in the education of the hundreds of thousands of youth who have from time to time entered the telegraphic service, the most prominent and influential educational feature imposed by the invention is the one which compels concentration and rapidity of thought, correct interpretation, the inviolability of confidence and the cultivation of brevity in expression within the limits of clear understanding. The vast good to mankind of multitudes educated with such a feature as a firm foundation cannot be estimated. The invention brought into existence a new school for the training of scholars ambitious to excel in the ranks of those who battle for material progress and human uplift. That school is in reality a university with unlimited resources and the person who enters it, takes advantage of its opportunities and does not succeed in life must find the reason for failure in his own lack of ability or want of character. Out of it have gone not only those who have excelled in the science of electricity, but many others who have adorned or do now adorn the professions of law, medicine and theology, or have written their names high up on the tablets of art, commerce and agriculture, finance and manufactures, and statecraft and literature. They have won the world's respect and honor, yet with it all they have never forgotten their alma mater, but ever turn their eyes toward it, and from their hearts proceeds a constant stream of love and affection to the memory of its founder.

"In looking throughout this country and seeing the honorable positions occupied by men to whom the telegraph has been the foundation and medium of their education, who can truthfully say that the peaceful, useful family founded by Samuel Finley Breese Morse does not outweigh in importance the dynasties of emperors and kings?"

Marking Poles for Identification.—The New York Public Service Commission, second district, has ordered all public service corporations within its jurisdiction, maintaining poles or other structures for carrying overhead wires, to stencil or mark such poles with the initials of the owner and with a number whereby the location of any pole may be identified.

Stanton Statue Unveiled.—A statue of Hon. E. M. Stanton, Secretary of War during President Lincoln's administration, was unveiled at Steubenville, Ohio, September 7. At the ceremonies a paper by Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, was read.

One of our agents in writing us states that: "It is surprising how many telegraphers spend more than two dollars and receive no benefit therefrom, while they hesitate and defer a payment of only two dollars for a subscription to TELEGRAPH AND TELEPHONE AGE that gives pleasure and profit for a whole year."

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Annual Convention of International Association of Municipal Electricians.

The sixteenth annual convention of the International Association of Municipal Electricians was held at Young's Hotel, Atlantic City, N. J., September 12, 13, 14 and 15. The weather was delightful and there was a large attendance.

The first session was called to order by President H. C. Bundy of Watertown, N. Y., at 10 a. m. Tuesday, September 12, and an address of welcome was delivered by Hon. George W. Carmany, acting mayor,

Mr. J. B. Yeakle, superintendent of fire telegraph, Baltimore, Md., responded in behalf of the association.

A new engraved certificate of membership in the association, designed by Mr. Adam Bosch, superintendent fire telegraph, Newark, N. J., was shown.

After the appointment of an exhibit committee, adjournment was taken until 2 p. m. At the afternoon session, Mr. Warren E. Fastnacht, city electrician of York, Pa., read a paper entitled "Copper Clad Steel Wire in Overhead Fire and Police Service."

After an interesting discussion of the paper, President Bundy, in a few appropriate remarks, moved that Mr. J. B. Yeakle, of Baltimore, be made a life member of the association. The motion was carried and Mr. Yeakle in a feeling manner thanked the association for the honor.

A copy of a resolution passed by the American Institute of Electrical Engineers, and forwarded to President Taft, urging the formation of a commission to prevent patent abuses, was read. The matter was referred to a committee.

At the Wednesday morning session, several letters of regret were read from absent members.

Mr. J. W. Kelly, Jr., chief of electrical bureau, Camden, N. J., then read a paper entitled "Modern Police Signal and Flashlight Systems." He described the system in use in Camden as typical of modern up-to-date methods. He spoke of the need of the adoption of standard systems which could be enlarged as needed.

After a short discussion of Mr. Kelly's paper, Mr. W. E. Fastnacht of York, Pa., described the system of police telegraph to be installed in that city. The discussion which followed was participated in by Messrs. W. Y. Ellett, C. E. Diehl and McManus.

At the afternoon session an address in memory of the late Jervis Meyers and Stanley W. Manning, members of the Association, was delivered by Mr. J. B. Yeakle, of Baltimore. Mr. Yeakle's remarks were full of feeling. A committee, consisting of Messrs. Yeakle, Ellett and McManus, was appointed to draw up suitable resolutions on the death of Messrs. Manning and Meyers to be forwarded to their respective families and inscribed in the minutes of the Association.

The report of the committee on "Grounding of Fire and Police Patrol Boxes" was presented by Mr. T. C. O'Hearne, city electrician of Cambridge, Mass.

Mr. O'Hearne presented tabulated figures based on replies to a number of questions, bearing on different phases of the subject, which he had sent out. The majority of replies favor grounding. The committee recommended that the association go on record as favoring such grounding. It also recommended the appointment of a committee to consider and report at the next convention on methods to be used in grounding.

After some discussion on the report the meeting adjourned.

As the convention was still in session at the time of closing the forms for this issue, the remainder of the report will appear in our issue for October 1.

Among those present were:

Allentown, Pa.—P. J. Beisel.
Atlantic City, N. J.—Geo. P. Proffatt.
Altoona, Pa.—C. S. Downs.
Bayonne, N. J.—Wm. R. Arbuckle.
Baltimore, Md.—J. B. Yeakle, wife and daughter.
Buffalo, N. Y.—R. H. Potter.
Cambridge, Mass.—Timothy C. O'Hearne.
Camden, N. J.—John W. Kelly, Jr., M. Kelly.
Cincinnati, Ohio.—A. P. Crocker and wife, Wm. C. Kiehl.
Cleveland, Ohio.—H. A. Bowen.
Detroit, Mich.—Louis Gascoigne.
Elizabeth, N. J.—M. S. Van Houten and wife.
Elmira, N. Y.—Will Y. Ellett.
Houston, Tex.—Clarence R. George.
Indianapolis, Ind.—John Berry and wife, O. C. Turshi.
Louisville, Ky.—Chas. F. Gall, P. G. Kern.
Little Rock, Ark.—John W. Bleidt and wife.
Meadville, Pa.—A. J. Balizet.
Mobile, Ala.—C. S. McCosker.
New York, N. Y.—Wm. D. Ligon, Mrs. John Brant, Fredk. Pearce and wife, Mrs. W. H. Pearce, E. Marcuson, T. Torrey and wife, H. M. Voorhes, John M. Spader, E. H. Fondersmith, R. A. Paterson, V. G. Stanley and wife, Allen D. Cross, Richard C. Smith, V. L. Crawford, A. P. Eckert and wife, Egbert C. Chamberlin, C. C. Johnson, Geo. P. Fondersmith.
New Rochelle, N. Y.—A. J. Bell and wife.
New Haven, Conn.—A. L. W. Kittredge, Miss F. G. Kittredge.
New Brunswick, N. J.—Robert Stuart.
Newark, N. J.—Adam Bosch and wife.
Norfolk, Va.—R. A. Smith.
Ottawa, Can.—Geo. F. Macdonald.
Pittsburgh, Pa.—Mrs. C. B. Sill, C. W. Abbott.
Philadelphia, Pa.—Chas. S. Redding, Julius Bernstein, N. B. Hazeltine.
Peoria, Ill.—W. E. Wolgamott.
San Antonio, Tex.—W. A. White.
Springfield, Ohio—T. S. Bosley.
Toronto, Ont.—John P. Craig and wife.
Watertown, N. Y.—H. C. Bundy and wife.
Wilkes-Barre, Pa.—R. H. McManus.
York, Pa.—Warren E. Fastnacht.

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The Railroad.

Mr. S. L. Van Akin, Jr., assistant superintendent of telegraph of the New York Central and Hudson River Railroad, Syracuse, N. Y., has charge of the railroad forces and telephone construction and maintenance.

Mr. E. E. Backus has severed his connection with the United States Electric Company, New York, to accept the position of superintendent of telegraph of the El Paso and South Western Railway, with headquarters at El Paso, Tex., vice H. W. Cutshall, resigned.

Mr. Charles Selden, superintendent of telegraph, Baltimore and Ohio Railroad, Baltimore, Md., whose appointment as general inspector of transportation in addition to his duties as superintendent, was announced in our issue of September 1, will be chairman of the committee on operating rules of the Baltimore and Ohio system. He will inspect train dispatching on the road, examine the work of dispatchers on all divisions and have general supervision of the transportation movement of trains. At the recent annual convention of the American Train Dispatchers' Association in Baltimore Mr. Selden was elected an honorary member.

Mr. Frank S. Spafard, acting superintendent of telegraph of the Chicago, Rock Island and Pacific Railway, Chicago, was born in Manchester, Mich., January 31, 1853, and began his telegraphic career at Osage, Iowa, in September, 1869, on the Illinois Central Railroad. He remained with that road until 1882, filling various positions in the meantime. From 1882 until 1892 he was train despatcher for the Burlington, Cedar Rapids and Northern Railway and superintendent of telegraph for the same road from 1892 until 1902. In the latter year he was appointed assistant superintendent of telegraph of the Chicago, Rock Island and Pacific Railway, and still retains this title, while performing the duties of superintendent of telegraph in place of the late J. G. Jennings.

Hours-of-Service Law in Texas.—The United States District Court at Austin, Tex., has fined the St. Louis Southwestern Railway Company $1,000 for violations of the telegraphers' clause of the Federal hours-of-service law. An appeal will be taken.

Railroads May Send Money by Telegraph for Transportation.—The Interstate Commerce Commission has issued an order allowing railroads to send money by telegraph to buy tickets. This is for the benefit of those who wish to send transportation and traveling expenses to people at a distance by paying the fare at the railroad office in the place where the sender lives.

Telephone Train Dispatching on the Grand Trunk.—Mr. W. W. Ashald, superintendent of telegraph of the Grand Trunk Railway System, Montreal, Que., states that the two telephone train dispatching circuits which have been in operation on his lines for the past eighteen months are giving excellent satisfaction and that it is the intention to use the telephone over the entire system. He does not think, however, that any additional circuits will be installed during the current year.

The Late J. G. Jennings.

The funeral of the late J. G. Jennings, superintendent of telegraph of the Chicago, Rock Island and Pacific Railway Company, Chicago, whose death was recorded in our issue of September 1, was held August 22, and was largely attended by prominent telegraph and railroad officials. Among the telegraph representatives present were Messrs. T. P. Cook, general superintendent; M. T. Cook, division commercial superintendent; W. J. Lloyd, division traffic superintendent, and A. B. Cowan and J. Fitzpatrick, district commercial superintendents, Chicago; J. G. Hilbert, district plant superintendent, Dallas, Tex., and others.

The railroads were represented by Messrs. W. M. Whitenton, general manager Rock Island lines, Fort Worth, Tex.; George H. Crosby, vice-president, and F. O. Melcher, second vice-president, Rock Island lines, Chicago, and many other general officials, and the following superintendents of telegraph: G. A. Cellar, Pennsylvania Lines West of Pittsburgh, Pittsburgh, Pa.; E. A. Chenery, Missouri Pacific, St. Louis, Mo.; P. W. Drew, Milwaukee, St. Paul and Sault Ste. Marie, Chicago; V. T. Kissinger, Chicago, Burlington and Quincy, Chicago; W. W. Ryder, general superintendent of telegraph, New York Central Lines, Chicago; F. S. Spafard, assistant superintendent of telegraph, Rock Island Lines, Chicago; F. T. Wilbur, Illinois Central, Chicago, and F. H. Van Etten, Southern Indiana, Chicago.

Radio-Telegraphy.

Mr. Jack R. Irwin, the wireless operator of the Wellman airship, was married recently to Miss Helen MacPage at Portland, Ore. Mr. Irwin is a native of Australia and is well known in telegraph and wireless telegraph circles.

Wireless on Motor Launches.—Many small motor launches are now equipped with wireless telegraph apparatus.

Wireless Station at Fort Sam Houston.—A powerful wireless telegraph station is to be established at Fort Sam Houston, Tex., by the Army Signal Corps, under the direction of Major George O. Squier.

Wireless in Peruvian Navy.—The Peruvian cruisers *Almirante Grau* and *Coronel Bolognesi* are the only ships of the Peruvian navy provided with wireless equipment, but it is expected that two other ships will be fitted out with wireless apparatus. The range of action of the two existing ship plants is 250 miles during the day time and from 250 to 1,500 miles at night. The wave length employed is about 900 feet.

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Wireless in the Amazon Country.—The Amazon Wireless Telegraph and Telephone Company of New York, is ready to accept business between Para, Santerem and Manaos, Brazil. It is 700 miles from Para to Manaos, which is in the centre of the rubber region.

Wireless on a Sailing Ship.—The cadet ship *Mersey* of the White Star Line is said to be the first sailing ship equipped with wireless telegraphy. The *Mersey* recently arrived in the River Thames, England, and the wireless apparatus on board was worked for eleven months without a single breakdown, notwithstanding the fact that none of the men on board had had any practical experience with wireless telegraphy. The Marconi system is used.

Wireless Station at Danzig.—The wireless station opened at Danzig, Germany, May 15, for general communication with ships at sea works from 6 a. m. till midnight in connection with the ordinary telegraph service. The T-shaped antenna rises to a height of 150 feet. The power is provided by 220-volt continuous current from the Danzig Municipal Works. The energy in the antennæ is 2.5 kilowatts. Both senders and transmitters are provided with variable wave-length scales. The normal range is nearly 400 miles by day and twice that distance by night, but the station has interchanged messages over a distance of 1,370 statute miles.

Intercepting Wireless Messages.—The demurrer interposed by Mr. Edwin T. Earl, a publisher of Los Angeles, Cal., to the indictment charging him with having published the contents of an intercepted aerogram, was sustained by Judge Bordwell, of the superior court. An appeal from the ruling will be taken. Judge Bordwell held that the law of 1872, to safeguard the contents of telegraphic messages, upon which the indictment was based, applied only to officers and employes of telegraph companies, and that, therefore, Mr. Earl committed no offense when he published an aerogram taken out of the air by three amateur wireless operators.

Wireless Messages from Automobiles.—A number of cadets from a military academy of the Northwest, says the *Electrical Review and Western Electrician*, are now making a tour of about three thousand miles through the east and back to Chicago in four automobiles, whose engines drive the generators for the electricity of the wireless apparatus with which each machine is equipped and the machines are operated about thirty or forty miles apart, communication being maintained by means of the wireless.

Each machine is provided with an extension mast, while balloons, also forming part of the equipment of each machine, can be utilized for carrying the antennæ to any desired height. The expedition expects to visit Washington, New York and other places.

A Brave Young Wireless Operator.—During the recent hurricane off the Carolina coast the steamer "Lexington," bound from Savannah to Philadelphia, was driven ashore on Edisto Island, and her wireless station wrecked. Jack Sheetz, the wireless operator, climbed the rigging at the risk of his life, and by means of improvised equipment sent out the distress signal, "S. O. S." The call for help was received by the revenue cutter "Yamacraw," which went to the aid of the disabled steamer. Sheetz, it is stated, is only sixteen years of age, and when the rescuing vessel arrived he climbed down from his perilous station in the rigging and fell exhausted on the deck.

Traveling Wireless Inspectors.—The Marconi International Marine Communication Co., Ltd., announces that it has appointed thirteen traveling inspectors, whose duties are: (a) to take charge of installations on ships; (b) to observe the working of ship and shore stations, and, whenever necessary, to report to head office instances of inattention or bad working; (c) to visit the company's ship stations in foreign ports, inspect installations, verify maintenance certificates, and render to operators any assistance that may be required; (d) to install apparatus on ships when required. Each inspector will have a letter or card of identification, which he will present, in order that the operator in charge of a station may give the necessary facilities for inspecting and overhauling the apparatus.

Pedersen Rapid Wireless System.—Many experiments have recently been made in the rapid transmission of wireless messages by the Pedersen system, says the London *Electrical Engineer*. The first attempts were made between Esberg and Lyngby, in Denmark (167 miles), then between Lyngby and Cullercoats (560 miles,) and finally between Lyngby and Knockroe, in Carlow, Ireland (900 miles). Speeds of 300 words per minute have been attained. The transmitting station works with a Poulsen generator, so that it acts by undamped vibrations. For signalling the primary circuit is not used, but only a small part of the self-induction in the antennæ is short-circuited. Half of one per cent. out in the tuning is good enough to enable clear signals to be given by the receiver, which is fitted with a crystal detector and a string galvanometer. The signals are marked on a tape automatically.

Story of Stanton During the Civil War.—Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, New York, is the author of an interesting article in this week's *Leslie's Weekly*, entitled "Stanton in the Dark Days of the Civil War." It is a very readable story and gives one an excellent picture of the famous War Secretary.

Mr. Harry Morlan, manager of the Postal Telegraph-Cable Company at Salt Lake City, writes: "I wish to congratulate you on the success you have achieved in making TELEGRAPH AND TELEPHONE AGE one of the headliners of them all, in the telegraph and telephone field. Success to you always."

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ORGANIZED 1867

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New Main Switchboard in New York Operating Room, Postal Telegraph-Cable Company.

BY DONALD McNICOL, OF THE ELECTRICAL ENGINEER'S DEPARTMENT, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

Several years ago the engineering department of the Postal Telegraph-Cable Company, realizing the importance of those problems which involve efficient and satisfactory switching systems, undertook the development of a central office switchboard which would embody those essential features, typical of the great advances made in contemporaneous lines of engineering work.

In developing a new type of switchboard the aim was to provide against fire hazards, to develop a unit system, which may be added to at any time without interruption to or disarrangement of units already installed and in service, to provide for compactness and flexibility, and to employ materials best suited to the various purposes.

Formerly, the construction of telegraph switchboards was carried on without due recognition of the fact that although telegraph wires ordinarily do not carry electric currents of such volume that there is a fire risk; the possibility of exposed lines coming in contact with other wires carrying dangerous potentials necessitates switchboard construction similar to that required for high tension wires.

Before the reconstruction of the switching system of the New York main office was undertaken, the new features intended to be embodied therein,

FIG. 1—SECTION OF NEW SWITCHBOARD, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

above referred to, were tried out in less important offices throughout the country, so that when the larger undertaking was launched each new departure had been thoroughly tested and perfected. How well the department planned in advance of the times is strongly evidenced in the flexibility of the new switchboard. Although this board was designed and its construction commenced several years ago, its rapid switching possibilities have been found to meet all new demands imposed by changing traffic conditions.

The construction and wiring of this board, two views of which are shown in the accompanying illustrations, was done without interruption to the service. The various units were installed separately.

All of the materials used were chosen only after careful investigation. The iron framework, the slate panels upon which the terminal connections, switches, etc., are mounted, the insulation material, the meter equipment, the pin jack and spring jack equipment were all selected with the object of anticipating future development as far in advance as good engineering could suggest.

Immediately in the rear of the switchboard proper are situated the terminal frames and cross-connecting frames constructed of iron and with plenty of aisle space between adjacent sections. From the terminal frames all connections are made with the main boards, leg boards, city boards, etc., by means of overhead cables. The attaching and suspending of these cables has been accomplished in a manner so workmanlike that while thousands of connections were needed to make up the circuits, there

FIG. 2—LOOP BOARD.

are no loose wires in view and the appearance of the terminal room as compared with switchboard building of a decade ago, clearly indicates the great advances that have been made in interior telegraph construction.

The two views shown give a general idea of the imposing and substantial appearance of this new board. The sections shown are those containing the west and south lines. Other sections of the board, not shown, contain the north and east lines.

The annunciator board shown in one of the photographs is an efficient auxiliary to reliable leased wire service. By means of this system the lessee has an instantaneous means of calling the attention of the main office to any interruptions or lapses of service. The annunciator attendant at the main office, who in each case is an expert wire chief, is enabled to cut in on any loop without leaving his chair.

One excellent feature of the new board is the system of "transfers," that is, the method of intercommunication between the various sections of the board. The attendants in charge of each section are able to transfer circuits to any remote section of the board by means of pin jack connections immediately in front of them, and without having to use rows of discs or long cords as formerly.

A high telephone official states that TELEGRAPH AND TELEPHONE AGE is by far the most valuable paper for information and general telegraph and telephone news that reaches telephone people.

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Repeater Adjustments.

BY GEORGE F. MILLIKEN, BOSTON, MASS.

In reading the article on repeater adjustments, by Mr. C. L. Higgins, of Cheyenne, Wyo., contained in your issue of September 1, I am led to call attention to the special means employed in the Milliken repeater to obviate the trouble noticed by Mr. Higgins in all of the repeaters mentioned in his communication.

This special feature consists of an independent spring for the extra local magnet, having the necessary tension to hold the relay armature mechanically closed while its main circuit is open; or more properly speaking, until the closing of the main circuit has effected the closing of the relay armature.

The extra local battery should be of sufficient strength, and the poles of the magnet near enough to the armature, to insure an effective holding of the relay armature lever under any possible high relay adjustment.

Turning up the armature spring of the extra local magnet causes the armature lever to lag in releasing the relay amature lever, after the closing of the main circuit. This action may be compared with the lag of any relay armature on a high tension adjustment when operated by the home key. In the case of this repeater, the home key is the sounder lever, and the adjustment of the extra magnet spring should be turned up until the lag slightly exceeds, or overlaps the lag of the relay lever which it is holding and which may be necessarily adjusted high on account of line escape.

Telephonography.

Prof. Pierluigi Perotti has been conducting experiments on the Italian state telephone lines with a new apparatus designed to record telephonic speech on phonograph cylinders.

The sending station contains the usual type of telephone transformer, to the primary of which a high sensitivity granule-microphone is connected in series with a four-cell (three point) primary battery.

The secondary of the transformer is connected to the metallic circuit line, and, at the receiving station, the incoming lines are connected to two loud speaking receivers in series. One of the receivers is used in the ordinary manner, but the second receiver communicates with the recording membrane of a Pathé phonograph, which is coupled to the sound box by a rubber sleeve.

The membranes are thus connected by a small enclosed volume of air. The vibrations of one membrane are transmitted to and repeated by the other, and are thence recorded by a sapphire style on a wax cylinder. The tube is attached to the traversing carriage of the phonograph, the receiver and sound box moving as one piece, this being permitted by the use of slack flexible leads.

It is advisable to speak somewhat louder than usual into the transmitting microphone and to provide a rather higher battery voltage in the sending circuit than is usual in telephone practice.

It is not compulsory to use the recorders, but the simple turning of a locking screw enables any or all of a message to be recorded at will. The record obtained can be subsequently reproduced at any time or place, and an imperfectly heard message can be repeated as often as desired, thus avoiding delay and all risk of error.

All the trials so far carried out show the present apparatus to be sensitive and accurate; applicable to any telephone line; cheap in first and operating costs and quite satisfactory in the hands of ordinary subscribers.

The Turner Monument Fund.

On September 2, Mr. E. P. Griffith, chairman of the Turner Monument Fund, Mr. R. S. Parsons, superintendent New York Division of the Erie Railroad, Mr. Charles Keck, of New York, sculptor of the monument, and Mr. C. T. Ford, superintendent of the Harriman estate, met at Harriman, N. Y., formerly named Turner, and selected a very appropriate site for the monument. Mr. Ford has begun work on the stone and Mr. Keck states that the bronze work will be finished by November 1.

The honor of unveling the statue has been offered to Miss Gertrude M. Griffith, daughter of Mr. E. P. Griffith, chairman of the Monument Fund, who has given so much thought and time to the enterprise and brought it to a successful issue. It is a fitting recognition and expression of appreciation of his work that his daughter should be selected to perform this pleasant duty.

There are no doubt many persons throughout the country who would like to become identified with the movement. These yet have an opportunity to send in their subscriptions to the treasurer of the fund, Mr. J. B. Taltavall, 253 Broadway, New York. All subscriptions are acknowledged in the columns of TELEGRAPH AND TELEPHONE AGE.

Contributions received up to date are as follows: Previously acknowledged, $1,653.25; Telegraphers' Mutual Benefit Association, New York, $1.00; Interest to July 1, 1911, $12.24; F. G. Sherman, New York, $5.00; F. M. Randolph, Chicago, Ill., $1.00. Total, $1,672.49.

The Awakening of China.—The cutting and stealing of the telegraph wires seems to be an everyday occurrence in Manchuria, the South Manchuria Railway Company having experienced no fewer than eighty-eight cases of the kind during the last three months.

Our Subscription Contest.

The announcement in our issue of September 1 of the opening of a contest for prizes to be awarded to those of our agents who send in the greatest number of subscriptions from September 1 until December 21, is beginning to show results and each agent is urged to do his utmost to se-

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cure the first prize, which will be $50. There will be five prizes in all, the second being $25, the third $15 and the fourth and fifth $5 each.

The conditions of the contest were published on page 594 in the September 1 issue and all interested in this matter would do well to study them carefully.

The contest is not limited to present agents alone. Anyone in a section where we have no agent can take up the work of canvassing by securing an agency appointment. Agents in a country district will find as great a field for obtaining subscriptions as does the city agent in his locality. All the operators are not in the cities, and it is those outside of the large offices that we particularly desire to reach.

This contest presents an excellent chance for hustlers to earn some extra money easily. There is only one first prize and all the contestants stand the same chance of capturing it.

Annual Meeting of T. M. B. A.—The annual meeting of the Telegraphers' Mutual Benefit Association will be held at 195 Broadway, New York, November 15. In accordance with a resolution passed at the last annual meeting the proposition to amend section 2 of article IV of the constitution will be acted upon. The section amended as proposed will read as follows: "Sec. 2. There shall be an Executive Committee consisting of six members who shall be elected as hereinafter described. In addition the officers and those who have heretofore been presidents of the association shall be ex-officio members of said committee."

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

Under the supervision of Mr. W. A. McAllester of the Central Cable office, an opportunity has been given to the messenger boys, the office boys and the clerks to learn telegraphy by attending an electrical class two nights a week. This educational feature is being gone into very thoroughly and the young men are much pleased at the outlook for their future. They recognize that there is promotion ahead for them and the initial meeting found fifteen of them eager to learn the telegraph profession. Mr. C. H. Burkner a well posted member of the staff is acting as teacher.

NEW YORK, POSTAL.

Mr. J. J. Whalen, manager of this office, recently returned from a five weeks' trip on company business. He visited various western cities, including Chicago and St. Louis, and Toronto and Montreal, Canada.

PHILADELPHIA, POSTAL.

Mr. P. A. Hickey, chief operator of the Cotton Exchange, New York, and wife, were recent visitors.

Night chief operator E. H. Locke has returned from his vacation.

Manager J. A. McNichol and cashier J. H. Wilson represented this office at the recent Old Timers' Convention at Atlantic City.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
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Mecograph.—The operator of today has a great many advantages over the operator of a decade or more ago. He can do his work with much less fatigue by the use of a sending machine, and he is free from the danger of becoming a victim of telegrapher's cramp. The Mecograph Premier is a sending machine that is well known and widely used. It is of simplified design and possesses many points of value that should be considered well by all intending purchasers. It is constructed in a first class manner and can be permanently adjusted. See the company's announcement on another page of this issue.

Among sound and reliable insurance organizations the Telegraphers' Mutual Benefit Association of 195 Broadway, New York, occupies a foremost place. Organized in 1867, it has paid to beneficiaries of deceased members $1,500,000. Reserve Fund, $327,000, the largest Reserve in proportion to liabilities that is held by any similar Association. All persons engaged in Telegraph or Telephone service between the ages of 18 and 45 are eligible for membership, no restrictions after admission as to change of occupation or residence. The lowest possible cost consistent with security offered. Write for blanks and further information.

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I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

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Telegraph and Telephone Age

No. 19. NEW YORK, OCTOBER 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Some Radical Alterations in Telegraph Apparatus.

It has been intimated by outsiders who evidently are not aware of all that is transpiring in the telegraph field that telegraph engineering has not advanced as rapidly in proportion as many other industries of like importance.

The fact is, however, that progress has not only kept well in step with other engineering developments in the past, but there are indications that the pace set will soon be so great that the critics may have to do a considerable amount of hustling to keep up.

During the past few years many changes in apparatus and methods for the betterment of the service have been made, and more are ready for installation. The principal reason many of the contemplated alterations have not been put in practical operation before has been due to the uncertainty of the outcome of the merging of the telephone and the telegraph interests from an economical and business point of view.

Now that this question has been finally settled the new office which is now being erected in New York, will contain much that is entirely new and revolutionary in the way of telegraph equipment.

In addition to the adoption of the more efficient Athearn quadruplex system, already in practical operation, many radical changes are to be made in the switchboards and office paraphernalia.

Probably the most noteworthy as well as important alterations contemplated will be the substitution in some boards of telephone jacks, somewhat modified, for the old wedge system, the minimization of cords, and an improved "office loop" arrangement.

In order to appreciate the superiority of the telephone jack method over the wedge system it is only necessary to give a description of the construction of the new loopswitch to be installed and note the contemplated alterations in the office loops, or legs.

The accompanying diagram will give the reader a good idea of the proposed changes. Instead of a springjack all multiplex local terminals at the loopswitch will consist of telephone jacks

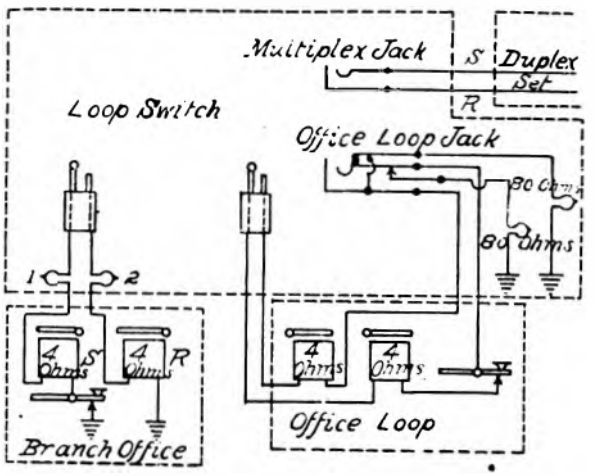

DIAGRAM OF TELEPHONE-JACK SWITCHBOARD.

similar to that shown in the upper right-hand corner of the illustration, while the wedges which now represent the terminals of the branch office loops, repeaters, special batteries, quadruplexes, etc., will be replaced by the usual telephone plugs as shown in connection with the office and branch loops.

The jack for the office loop is specially constructed, having four tongues instead of two, the purpose of which will be explained later. This office loop requires only one cord; the old style requires two.

Before further description, attention is called to a few weak points in the old system which the new method is expected to remedy. In the first place a wedge is reversible, hence the receiving and sending sides of a duplex loop may accidentally be transposed during rush hours and cause unnecessary delay. With a telephone jack such a thing cannot happen.

Again the spring, in time, weakens and wedges

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sometimes fall out unnoticed from the weight of the cords, while the hinge pin often becomes rusted and makes a poor connection. These faults, and they are frequent in old switchboards, will be entirely eliminated in the new apparatus.

NEW OFFICE LOOP ARRANGEMENT.

One of the greatest improvements to be made in the new equipment is that in the office loop. In the old or present type the compensating lamp resistance which is cut in when a branch loop is removed from the multiplex set is located on the desk where the operator works and is controlled by him or the traffic chief by a double three point switch, also on the desk. The weak point of this method is that whenever a branch loop is to be cut in or removed from the circuit the traffic chief must first be notified. As the legs are usually some distance from the quadruplex department, which gives the orders to connect or disconnect the loops, and in some cases in another room, considerable delay often occurs before the notice is received. In addition to this operators sometimes turn the switches the wrong way and this causes further delay before the trouble is discovered. By means of the new method shown in the accompanying diagram such delays cannot occur as the switching will be done automatically, the three point switch being eliminated and the lamp removed from the desk.

Furthermore, when telephone jacks are used the sending and the receiving sides of a loop cannot be reversed as is now possible when the wedge forms the terminals. Still another advantage derived from the new arrangement is that only one cord is required against two in the old style.

It will be seen that the new office loop jack is somewhat differently constructed from the regular telephone jack, as it possesses four tongues or conductors instead of two, the extra pair being connected to the two compensating lamp resistances, which will be located behind the loop switchboard. For illustration, if the office loop alone is to be placed on a multiplex set the loop simply inserts the plug in the multiplex jack in the usual way. By tracing the course of the current it will be seen that after flowing through the office loop sounders it reaches the ground through the lamp resistances shown. When a broker or branch office loop is added to the circuit the plug for the latter is placed in the office loop jack, also shown in the diagram. The insertion of this plug lifts levers leading to the grounded lamps and the current then shifts its course through the loop conductors where it finds a ground at the branch office. The removal of the loop restores the ground behind the board, hence no one is required to be notified to complete the operation.

In case two office loops and one grounded branch loop are to be connected with the multiplex set the first office loop plug must be removed from the multiplex jack and placed in the jack of the second office loop, while the plug of the latter in turn must then be placed in the multiplex set jack. To add the branch office loop it is then only necessary to insert the plug of that loop in the jack of the second office loop.

Recent Telegraph and Telephone Patents.

ISSUED SEPTEMBER 5.

1,002,222. Telephone System. To H. P. Clausen, Chicago, Ill.

1,002,238. Telephone Attachment. To G. A. Duryee, New York.

1,002,239 and 1,002,240. Telephone System. To A. H. Dyson, Chicago, Ill.

1,002,267. Morse Transmitter. To T. Habermann, Hemslingen, Germany.

1,002,277. Telephone System. To A. R. Kahl, Rochester, N. Y.

1,002,563. Sender for Automatic Telephone Systems. To E. E. Clement, Washington, D. C.

1,002,713. Selective Signaling System. To O. M. Leich, Chicago, Ill.

1,002,735. Automatic Telegraph-Key Closer. To D. E. Motz and F. B. Hatfield, La Jara, Col.

1,002,783. Detachable Telephone Support. To B. W. Sweet, Cleveland, Ohio.

ISSUED SEPTEMBER 12.

1,002,832. Sound-Conducting Attachment for Telephone Receivers. To C. H. Gatchell, Boston, Mass.

1,002,878. Party-Line Telephone System. To S. A. Souther, Chicago, Ill.

1,002,891. Telephone System. To C. S. Winston, Chicago, Ill.

1,002,936. Telephone Attachment. To R. E. Southwick, Los Angeles, Cal.

Personal.

Mr. C. D. Lee, president of the United Press, New York, is on a business trip through the middle west.

Mr. S. S. Garwood of Philadelphia was in New York September 20, attending an executive committee meeting of the Telegraphers' Mutual Benefit Association, of which he is a member.

Mr. Dion J. Arnold, of Chicago, a prominent electrical and mechanical engineer and an old-time telegrapher, has been retained by the city of San Francisco, Cal., to investigate the street railway situation there.

Mr. E. K. Dyer of the Western Electric Company, San Francisco, Cal., son of Mr. I. T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake City Railroad Company, Los Angeles, Cal., was a recent New York visitor.

Mr. John H. Bell, engineer with the Western Electric Company, New York, whose appointment was recorded in the September 1 issue, has had a valuable technical experience in the British service. He was born at Aberdeenshire, Scotland.

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September 6, 1879, and entered the telegraph service as operator in the Central Telegraph office, London, in 1895, where he remained until 1900. He was operator and engineer in South Africa during the Boer war, between 1900 and 1902, and between 1902 and 1911 he was on the staff of the engineer-in-chief of the British post office. During the present summer he came to New York and accepted a position with the Western Electric Company.

Mr. A. L. W. Kittridge, superintendent of police telegraph, New Haven, Conn., was a recent New York visitor.

Mr. Gilbert F. Hayes, wire chief, Western Union Telegraph Company, at Cheyenne, Wyo., was married to Miss Frances D. Ries on September 6.

Mr. G. H. Groce, assistant to the president of the General Railway Signal Company, Rochester, N. Y., was a recent New York visitor.

Mr. F. G. Creed, manufacturer of the Creed automatic printing telegraph system, London, England, is in the United States on business connected with printing telegraphy.

Mr. F. G. Jones, of the Jacksonville, Fla., Western Union office, who has been in the hospital at Philadelphia for several weeks, has returned to Jacksonville in excellent health.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay, president, has returned from a few weeks' visit to Europe.

Mr. C. C. Adams, second vice-president, New York, is on his way home from Europe and will arrive on the steamer "Kronprinz Wilhelm" about October 3.

Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company, New York, arrived from Europe on the steamer *Adriatic* September 28.

Mr. W. I. Capen, general superintendent of plant, New York, will leave for Jacksonville, Fla., October 1.

Misses T. N. Brown and E. M. Allen, and Mrs. A. W. Porter of the executive department have returned from a trip through the West, which they made together.

Mr. J. H. Hess, of the electrical engineers office, New York, has resigned to accept the position of manager of the Monticello Telephone Company, Monticello, N. Y. Mr. Hess has been in the service of the construction and engineering departments of the Postal Company for the past twelve years.

Mr. W. H. Romedy, of the Jacksonville, Fla., office, has been appointed chief operator at the same point, vice W. J. Johnston resigned. Mr. Romedy holds the remarkable bonus record of 885 messages in nine hours.

Mr. Joseph Johnson, chief operator of the Western Union Telegraph Company at Houston, Tex., has resigned to become chief operator for the Mackay Telegraph and Cable Company at the same place.

The Mackay Telegraph and Cable Company has opened offices at Houston and Galveston, Tex. It will open an office at Austin, Tex., on October 10 and at San Antonio at the end of the month.

Postal Telephone Service.—The Postal Telegraph-Cable Company announces telephone service over its wires between San Francisco, Sacramento, Reno and Salt Lake City. The rate between Salt Lake City and San Francisco is $1.50 for the first five minutes. Between Sacramento and San Francisco the rate is 25 cents for the first five minutes, each additional minute being charged at the rate of 5 cents.

Magnetic Club Fall Dinner.

The Fall dinner of the Magnetic Club, New York, will be held on the evening of Wednesday, November 15, probably at the St. Denis Hotel. The club will entertain as guests the delegates to the annual meeting of the Telegraphers' Mutual Benefit Association, which will be held in New York the same day.

A Royal Wireless Operator.—King Albert of Belgium has had a complete radio-telegraphic system installed at his palace at Laeken for the purpose of conducting experiments.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

The annual meeting of the stockholders of this company will be held October 11, and the election of officers for the company will take place a week later, October 18.

Mr. H. C. Worthen, general superintendent, Southern Division, Atlanta, Ga., was a recent executive office visitor.

Mr. W. J. Bagby, district superintendent of the American District Telegraph Company of New Jersey, with headquarters at Philadelphia, was a recent New York business visitor.

Mr. H. E. Johnson of Cortland, N. Y., has been promoted to the managership of the Niagara Falls, N. Y., office, vice C. H. Simpson advanced to be manager of the Brooklyn, N. Y., office.

Mr. T. J. Farrell, formerly manager of the Bridgeport, Conn., office now occupies a position in the office of Mr. W. A. Sawyer, district commercial superintendent, New York, in connection with telephone matters. Mr. Farrell was succeeded by Mr. G. C. Wardwell, formerly of Mr. Sawyer's office.

The following managers have been appointed in the Southern Division: Mr. Herbert Hall, at Beaufort, S. C., vice E. A. Donaghue; Mr. C. J. McNab, at Barnwell, S. C., vice H. Mullis; Mr. D. M. Dunn, at Pulaski, Va., vice Miss A. V. Nealon, transferred to special duty at Oxford Orphan Asylum; Mr.

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T. C. Parker, at Suffolk, Va., vice Rogers White, who leaves the service; Mrs. H. L. Hall, at Wadesboro, N. C., vice Mrs. M. R. Thompson, and Mr. J. E. Hill, at Dillon, S. C., vice C. E. Peck, who enters other business.

Mr. O. Stanley, manager at Vicksburg, Miss., has been transferred to Memphis, Tenn., as manager of the Cotton Exchange branch. He is succeeded by Mr. L. C. Flora, formerly manager of Corinth, Miss.

Mr. W. M. Burt has been appointed manager at Corinth, Miss., vice Mr. L. C. Flora, transferred to Vicksburg.

Mr. C. Savage has been appointed manager at Laurel, Miss., vice Mr. J. A. Pryor, resigned, and Mr. E. F. Ramey, at Owensboro, Ky., vice Mr. J. W. Porter resigned. Mr. H. H. Ramey has been appointed manager at Paintsville, Ky.

Mr. P. F. Dowd has been appointed manager of the office at 129 Columbus Avenue, New York, vice H. Putterman transferred to the operating department at 195 Broadway.

Mr. George S. Walters, district commercial manager at Pittsburgh, Pa., has been transferred to a like position at Clarksburg, W. Va. He will have charge of the northern West Virginia territory.

Mr. W. O. Walters, manager at Uniontown, Pa., has been transferred to the managership at Jamestown, N. Y., vice J. C. McGrew.

Mr. L. A. Watson, manager of the East Liberty branch office, Pittsburgh, Pa., has been advanced to the managership of the Uniontown, Pa., office, vice W. O. Walters.

Mrs. Josephine Rawson has been appointed manager of the East Liberty, Pittsburgh, Pa., office, vice L. A. Watson.

Mr. L. L. Leith, formerly Morse wire chief of the Central District and Printing Telegraph Company, Pittsburgh, Pa., has been appointed special agent of this company at the same point. He will have charge of joint telephone-telegraph matters, leases and renovations.

Mr. Earl Burton, formerly in charge of the messenger service at the Pittsburgh office, has been appointed district supervisor of messenger service for the entire district.

Mr. Joseph Diehl, formerly delivery clerk, has been appointed supervisor of messenger service for the city of Pittsburgh.

Mr. Edmund J. Burke, assistant manager of the Springfield, Mass., office, has been appointed manager of the Burlington, Vt., office, vice Mr. C. B. Kelley transferred to Springfield as manager.

Mr. F. M. Houser, chief operator at Jacksonville, Fla., has resigned to enter other business. On his retirement he was presented with a gold watch from his office associates, Mr. H. O. Turner acting as spokesman.

Mr. W. L. Glasheen, who was transferred from San Francisco, Cal., to the plant department of this company at New York, has returned to San Francisco for the same interests.

A game of baseball played on September 23 between the teams representing the supply department and the general manager's office was won by the former, the score being 15 to 3. The victorious team is under the management of Mr. H. J. Schaper.

A club and rest room and a place for instruction is being arranged for the employes of this company at Minneapolis, Minn.

The Telephone.

New Exchange for Lowell.—The New England Telephone and Telegraph Company will erect a new exchange building in Lowell, Mass.

Telephones in New York City.—The number of telephones installed in New York City September 25 was 426,244, an increase of 24,718 since January 1.

New Exchanges for New York Telephone Company.—The New York Telephone Company will enlarge its exchange at East Orange, N. J., and will build an extension to its Watertown, N. Y., exchange.

Chinese Telephone Directory.—The Illinois Tunnel Company, Chicago, which is installing an automatic telephone system, has so large a business among the Chinese residents of that city that it has gotten out a directory printed in Chinese characters.

Obituary.

Thomas E. Crimmins, a well-known contractor, who installed most of the electrical subways in New York, died September 8.

William Wickenson, aged 70 years, who was chief electrician of the steamship "Great Eastern" when she laid the first Atlantic cable, died at his home in Revere, Mass., September 13.

Nicholas Lee, formerly chief operator of the Western Union Telegraph Company at St. Paul, Minn., died August 17 of heart failure. At the time of his death he was connected with the plant department of the same company at Minneapolis. He was a well-known and highly respected official of the company.

Thomas M. King, aged 66 years, an old time telegrapher and a member of the United States Military Telegraph Corps during the Civil War, died at his home at Irvington-on-the-Hudson, N. Y., September 14. Mr. King retired from active business many years ago. He was prominent as a railroad official for twenty-five years, being for a greater part of that time vice-president of the Baltimore and Ohio Railroad. He attended the Chicago reunion of the Old Time Telegraphers' and Historical Association in September, 1910.

Wireless in Portugal.—The Portuguese government has notified the British and Italian governments that it has decided to adopt the Marconi system of wireless telegraphy. Stations are to be erected at Lisbon and the principal ports along the coast and at Cape de Verde.

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Convention of International Association of Municipal Electricians, Atlantic City, N. J., September 12, 13 and 14.

In our issue for September 16 we printed the proceedings of the first two days of the convention of the International Association of Municipal Electricians at Young's Hotel, Atlantic City, N. J., September 12, 13 and 14. The convention being still in session at the time of going to press, we were compelled to withhold the rest of the report for the present issue.

At the morning session of Thursday, September 14, Mr. H. M. Beck, of the Chicago office of the Electric Storage Battery Company, Philadelphia, read a paper entitled "The Storage Battery in Municipal Service." The paper dealt largely with the care of storage batteries and the author pointed out the importance of giving them proper attention in order to obtain the best working results from them. The paper was fully discussed by the members and many facts of interest were

J. W. KELLY, JR.,
Camden, N. J., President International Association of Municipal Electricians.

developed. Extracts from the paper are published on another page of this issue.

At the afternoon session Mr. A. C. Farrand, formerly city electrician of Atlantic City, read a paper on underground construction, in which he pointed out the relative values of rubber and paper insulation for cables. The paper was very fully discussed.

The election of officers for the ensuing year resulted as follows: President, J. W. Kelly, Jr., Camden, N. J.; first vice-president, John Craig, Toronto, Ont.; secretary, Clarence R. George, Houston, Tex.; treasurer, C. E. Diehl, Harrisburg, Pa.

The executive committee consists of W. E. Volgastt, Peoria, Ill.; A. C. Farrand, Atlantic City, N. J.; A. L. Pierce, Wallingford, Conn.; R. A. Smith, Norfolk, Va.; John Berry, Indianapolis, Ind.; W. R. Arbuckle, Bayonne, N. J.; C. S. Mcosker, Mobile, Ala., and Louis Gascoigne, Detroit, Mich.

The convention then adjourned to meet in Peoria, Ill., in September, 1912.

THE EXHIBITS.

There was an extensive display of apparatus of all kinds of interest to municipal electricians.

Mr. E. Marcuson, of New York, exhibited portable testing batteries and a portable lighting outfit for use in manholes, etc.

The Duplex Metals Company, of Chester, Pa., was represented by Messrs. G. P. and E. M. Fondersmith and R. A. Paterson. They showed copper-clad, bare and insulated wire and cable and copper-clad nails.

The Gamewell Fire Alarm Telegraph Company, of New York, had an extensive exhibit of its apparatus. It showed an improved flashlight for summoning patrolmen; also fire alarms for schools and factories. The exhibit also included a storage battery equipment for operating fire alarm systems. It was in charge of Mr. T. Torrey, general agent.

ENTERTAINMENT.

There was an abundance of entertainment provided for the members and their friends. On Tuesday evening the ladies of the party were given a roller chair ride on the boardwalk. On Wednesday evening a "gabfest and electrical stunts," were given in the convention hall.

The programme further provided a trolley ride to Longport and return to Inlet Park, Thursday afternoon, which was followed by a complimentary dinner to the association by the Gamewell Fire Alarm Telegraph Company.

Saturday morning a trip was made to Camden, N. J., also a visit to the New York Ship Yard and inspection of the great battleships there, followed by an automobile ride.

Our Subscription Contest.

It is desired that every agent of TELEGRAPH AND TELEPHONE AGE shall take active part in the contest for the prizes offered in our issue for September 1, for the largest number of new subscriptions during the months of September, October and November, and up to December 20, when the contest will close. The subscriptions are now beginning to come in, and the results so far are satisfactory, but it is evident that all of our agents have hardly got into full operation. Every one of them should put on an extra pressure of energy. There is a large field to work in and their success in obtaining new subscribers depends upon their own efforts. The first prize is $50, and the possibility of winning this is certainly worth a little extra effort on their part. Everyone has an equal chance in winning one of the five prizes.

In offices where there is no regular agent an agency may be established by securing an appointment, and any reliable person can thus enter the contest. An agent in a small office has just as good a chance to win as has the one in a large office, and we hope that many more new agencies will be established. There are many telegraphers throughout the country who are not subscribers, but who ought to be for their own good. If these are approached in the proper manner they can be won over.

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Joint Telegraph and Telephone Offices.

The following announcement is made by Mr. S. M. Williams, of the Western Union Telegraph Company, New York, with reference to the joint use of offices by the Western Union Telegraph Company and the American Telephone and Telegraph Company:

Supplementary relations between telegraph and telephone services are being carried into further practical operation in the Eastern Division of the Western Union Telegraph Company. Joint use of facilities during the past year has been confined principally to wires. Now a system of joint offices is being put into effect, for the increased efficiency of the service and the greater accommodation of the public.

In very many of the smaller communities, the only telegraph office is in the railroad station, under control of the railroad agent, and usually it is located at some distance from the business center of town. It is open for business, as a rule, only during day hours. On the other hand, the telephone office and exchange is centrally located and open for business day and night.

There are many very small communities that have no telegraph office at all, but are reached by the telephone. These will now have a Western Union office.

In working out a plan to meet the varying conditions it was found advisable to divide the joint offices into four classes, designated as Class 1, Class 2, Class 3, and Class A.

Class 1 is an office turned over by the telegraph company to the telephone company for the latter to operate telegraphically as agent of the former. The telegraph company runs its wires to the telephone office and furnishes the necessary equipment. Offices of this class will be in the larger towns and villages where there is sufficient volume of business to require the services of a telegraph operator. The telegrapher will be an employe of the telephone company, but performing both telegraph and telephone duties. Separately, there would not be enough duty to occupy the time of an employe, but the joint service permits economical operation of the office. So far as the telegraph part is concerned, the routine of the office, the keeping of records and the making of reports will be the same as at regular telegraph offices.

Class 2 offices are identical with those of Class 1, save that they are not operated telegraphically, but by telephone; that is, the business being of too small volume to warrant the services of a telegraph operator and telegraph installation, it will be transmitted by telephone to the nearest independent Western Union office. At Class 2 points, telephone subscribers will be connected directly to the Western Union office, to which the business is transferred, but anyone desiring to personally file a message may do so, in which case the employes of the telephone company will transmit the same to the transfer telegraph office.

On the other hand, business destined to Class 2 offices will be telephoned by the transfer telegraph office to the telephone subscriber. If the addressee has no telephone, the transfer telegraph office will telephone the message to the telephone operator for delivery from the Class 2 office. There will be no additional telephone toll charges for customers at Class 2 offices. The standard telegraph rates will apply.

Class 3 offices will include such stations and toll stations as may be agreed upon at points where the telephone company does not operate an exchange and where at the present time an additional toll line charge is exacted. It is proposed, so far as the telephone company can control such points, to make them Western Union offices and eliminate the toll line charge. The method of operating these offices by telephone is identical with those in Class 2.

The Class "A" offices will include those now known as "Public Pay Stations" in cities and towns where the telephone company's attendants will accept and forward telegrams to the local telegraph office, the attendant acting as agent for the telegraph company. No telephone toll charge is to be made to the person desiring to send telegrams at such stations.

In the Eastern Division up to September 15, sixty-two offices of Class 1 type are being operated by the Associated Bell Companies or are in process of installation. Most of these are in New England, but the New York Telephone Company is inaugurating the same policy in its territory.

A large number of Class 2 and Class 3 offices have been, or soon will be, taken over by the Associated Bell Companies. Of the Class A type, there have been 983 offices already established.

The public will appreciate this combined service because it will afford continuous telegraph service at practically all Class 1 and Class 2 points, where formerly there was a limited hour service.

In addition, there will be abolished the extra charges on telegrams that have heretofore been imposed on many small communities not reached by the direct telegraph lines.

Secret Telegraph.—Mr. Walter P. Phillips, a well known old time telegrapher and formerly general manager of the United Press and the United Associated Presses is the inventor of a secret telegraph system which was designed to avoid the eavesdropping evil on telegraph wires. To accomplish this a telephone receiver is placed in parallel with the sounder or relay and one stop or contact of that instrument is made silent by substituting a stop of rubber or other suitable material, thus mutilating the signals. A switch is provided for cutting the telephone receiver out when not in use. When a station is called the operator can recognize his call, even though the signals are mutilated. He then throws his switch, cuts in the telephone receiver, cuts out the sounder and receives the message.

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Telephones in England and the United States.*

BY T. F. PURVES, OF LONDON, ENGLAND.

So far as telephones at least are concerned we in this country [England] have always freely admitted the immense contributions to the development of the art which have come to us from across the Atlantic. America was the cradle of the telephone and has been from the first peculiarly its home. Its telephone engineers have led the world. The multiple switchboard, which first enabled large numbers of lines to be handled in one exchange, the common battery lamp signalling system, which greatly improved the service and reduced its working costs, and the automatic or machine systems of telephony, which aim at the elimination of the human agency of the operator, are all the product of American brains, and many of the original and most notable pioneers of these developments are still in active and responsible control.

So we have no kind of diffidence in seeking information from the Americans or in copying anything in their practice that will suit the conditions of this country.

But I would not give all the credit for the wonderful development which has scattered eight millions of telephones up and down the United States to their engineers and commercial managers. The American public has taken to the telephone as a duck takes to water, and its insistent demand has been a continuous spur to those in whose hands the provision of the service has rested. Its progress has been greatly helped by the absence of many of the facilities for cheap and rapid postal and telegraph communication, to which we on this side are so accustomed that we have ceased to notice them. The post is uncertain, and in country districts people have sometimes to travel a long way to post or obtain their letters. It is slow compared with ours, especially for internal city communications. The telegraph has been costly and poorly developed. Even at the present day there is a vast rural community which it does not serve at all.

I think the tendency to the erection of tremendously high buildings in American cities has also helped the telephone. When a man's office is perched, it may be, on the twentieth or thirtieth floor, he wants to do as much business as possible without going outside, and the telephone is a *sine qua non*.

I think the telephone is better suited to American business methods than to English. The American makes important contracts by word of mouth and is quite contented to do much of his business by telephone. He has recognized it as the greatest time-saver ever invented, and as a business-bringer that he cannot afford to be without either in his office or his private house. Consequently he sees that he gets it, and he doesn't mind paying for it. When the same attitude becomes general on this side of the water we are not likely to hear so much of England's backwardness in telephone development.

The telephone companies of the United States are, at the present time, divided into two great camps—the "Bell" companies and the "Independent" companies. The former group represents the companies formed to work the system under the patents of Prof. Alexander Graham Bell, the acknowledged father of telephony. There are between thirty and forty such local Bell companies covering the whole of the country, and they are now gathered into an aggregate of partially autonomous units under the general guidance and control of the American Telephone and Telegraph Company, which also owns and works in its own name a huge network of long-distance lines connecting up the various local companies and providing them with inter-communication up to the extreme distance limits of telephonic speech. Its total capitalization is, I think, somewhere around $700,000,000, and its president, Mr. Theo. N. Vail, is one of the financial powers in the land.

The number of "Independent" companies runs into hundreds. Some of them are large and comparable with the Bell companies, but for the most part they are quite small. The operations of the small companies are, in many cases, confined to a single town. They came into existence as the result of local enterprise, on the expiration of the Bell patents several years ago, with the idea of cheapening the service by competition. Taken altogether they now own about half the total of 8,000,000 telephones. The spirit of competition between the Bell companies and the independent companies is very keen. It has banded the independents into a fairly coherent group, which strives with might and main, and with a vast amount of sound and fury, to get the better of its formidable rival. Many of the advertisements and counter-advertisements are distinctly amusing, and the battle is followed with much relish and appreciation by the general public.

I am afraid I must admit that the telephone service is distinctly smarter in the large towns of America than it is with us. We have plant and equipment practically identical with that of New York or Chicago, yet the result in speed of service does not seem to be as good. So far as I have had chances of observing in the States, all classes of workers—builders, porters, street excavators, meat packers in Chicago, iron and steel workers in Carnegie's Pittsburgh mills, factory hands of all kinds, waiters, clerks, telegraphists, and, I fear I must add, telephone operators—seemed to apply themselves to their business more diligently and whole-heartedly and with more effortless efficiency than we are accustomed to see on this side. Yet in America telephone operators are much more difficult to get than in this country, and might therefore be expected to adopt more easy-going and independent ways.

The long-distance service in America is often referred to as much more prompt than that given by the British Post Office, but the general statistics of the two services as a whole show that the average delay before a trunk connection can be obtained in England is not very much greater than it is in America. The superiority of the American service is principally in communication between large centres,

*From The Post Office Electrical Engineers' Journal, London.

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and in this respect it is indisputable. The explanation is simply that trunk lines between the principal cities are provided in America on a much more lavish scale than has been done in this country. Consequently the American rates are high; as a matter of fact they are two or three times as high as the British Post Office charges for conversations covering the same mileage. This is a very important point which should not be lost sight of when comparing the two systems. The public pays with the usual American readiness, but nevertheless the statistics show that the trunk service is relatively much less used than it is in this country—another very important point in comparisons of public utility. The small man cannot afford the luxury of as much long-distance telephoning as he can here, and the richer users, who can afford it, get the benefit in promptitude of service. In this country, with its lower charges, the trunk lines carry far more traffic, and one has to wait longer for one's turn. It would be a hard matter to get the British public to stand the increase in the trunk charges necessary to pay for the building of the great numbers of additional lines which would be required to bring the service up to the American standard. Each line must bring in an adequate revenue to pay for working and maintaining it if the service is to be conducted on a business footing, and the problem the Post Office has to face in the speeding up of the trunk service is not at all an easy one. I may say that not only do our trunk lines show a much smaller proportion of idle time than those in America, but the proportion of waste time, that is, time occupied in passing calls and arranging for connections, is also much lower.

On the point of quality of speech transmission there is not much to choose between the two administrations; if anything, I think, the balance is in our favor. Our lines are, on the average, more carefully constructed.

How to Increase the Membership of the Old Timers.

BY J. H. SHEARER, ELMIRA, N. Y.

At the Atlantic City convention of the Old Timers, September 5, 6 and 7, I suggested the necessity of increasing the membership of the association and the advisability of each member pledging himself to secure at least one new member during the coming year. I realize that it is easy to suggest things, but quite a different matter to carry them into execution. Lest I be placed in this category, I desire to point out a way to increase the membership of the association which I think should be very effective.

Let each member send to the secretary the names of all old operators whom he may know, and the secretary can then take the matter up directly with the prospects, sending printed literature and other pertinent information. No member should, however, let his efforts drop then. He should use his best endeavors to get the eligibles interested and thus supplement the work of the secretary.

A little personal persuasion will accomplish a great deal in this work, and every member who knows of eligibles should take the matter up in earnest.

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 aid to students by asking questions on these subjects in each issue of our journal, so that students may be encouraged to study 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 unfold the answers. This method of acquiring technical knowledge is a fascinating one.]

CHAPTER IX (*continued*).

What is meant by the balancing of a quadruplex?

How is a quadruplex balanced?

What is the ground coil?

What is the purpose of the ground coil?

Should the resistance in the ground coil be varied?

What is the effect of altering the ground coil resistance?

In balancing a quadruplex why does the armature lever of the polar relay remain on either side with equal force when the balance is correct?

When the home battery is cut in why is it necessary to change the resistance in the rheostat.

What does it indicate when it is found difficult or impossible to centre the polar relay armature tongue?

Are condensers usually necessary to neutralize static discharges on short circuits?

What is the effect of induction upon the capacity of a wire?

What is the effect upon the relay of the discharge of static electricity from the line?

Where is the condenser placed, with reference to the other pieces of quadruplex apparatus?

When the condenser is properly adjusted what is its action upon the relay?

Why does the static discharge from the condenser neutralize that from the line?

If the polar relay responds to each motion of the home pole changer what does it indicate?

Study the various methods of obtaining a static balance.

After each station has balanced against the other, what further test should be made?

In testing for adjustments how is a correct balance indicated?

What is the effect upon the operation of the set when the pole-changer contact points are dirty or uneven?

Why do oxidized main contact points affect the working of a quadruplex?

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Sketch of the Organization and First Reunions of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps.

BY COLONEL G. M. DUGAN, TIP TOP, KY.

[The records of the proceedings of the first ten meetings of the Old Time Telegraphers and the Society of the United States Military Telegraph Corps having been destroyed in the fire in the Western Union Building, 195 Broadway, New York, in 1890, Col. G. M. Dugan, one of the chief promoters of the Old Timers' organization, has kindly supplied the following brief account of those meetings from his own records. In 1897 Mr. W. J. Dealy, of New York, compiled the proceedings of the first four meetings, which were published in 1900 by the Association. In 1900 Colonel W. B. Wilson, of Holmesburg, Philadelphia, president of the Society of the United States Military Telegraph Corps, compiled the proceedings from 1885 to 1894 and for 1897, from notes and papers of those meetings which contained many valuable and important historical facts. This matter has, however, never been published.]

Early in 1880 a circular was sent out proposing a re-union of all old time telegraphers, and was signed by Anson Stager, vice-president and general superintendent, Western Union Telegraph Company, Chicago, Ill.; Charles E. Taylor, manager Western Union Telegraph Company, Frankfort, Ky., and J. A. Armstrong, manager, and J. C. Mattoon of the Western Union Telegraph Company, Cincinnati, Ohio, calling a meeting at Cincinnati for May 15, 1880. After some correspondence with those interested, the time was changed to September 8, the same year. The call brought together at the Burnet House almost one hundred veterans of the wire. The telegraphers of Cincinnati were very much enthused and spared no expense to make the meeting a success. At 11 a. m. on the day of the meeting carriages were in waiting to convey the entire party through the city suburbs. At the county workhouse a lunch was furnished by superintendent James Morgan, after which the party was driven to Chester Park to see the famous trotter, Maud S. An exhibition of her speed was given in a mile dash. A drive was then had through the different suburbs, Clifton, Avondale, Mt. Auburn, etc., to the Highland House, where a business meeting was held. It was presided over by the late James D. Reid of New York. A committee was appointed to arrange for a permanent organization. Adjournment was then taken until 8 p. m. at the Burnet House.

The adjourned meeting was called to order at 8 o'clock with J. D. Reid in the chair. The committee on permanent organization—Col. R. C. Clowry, J. J. S. Wilson and E. P. Wright—reported in favor of the following for permanent officers of the Old Time Telegraphers' Association:

President, O. H. Booth, Mansfield, Ohio; vice-president, Geo. M. Dugan, Jackson, Tenn.; secretary, J. C. Mattoon, Cincinnati, Ohio; treasurer, F. A. Armstrong, Cincinnati, Ohio. Niagara Falls was selected as the place of the next meeting, and the third Wednesday in September, 1881, as the time.

Eighty-eight members sat down to the banquet. The arrangement of the tables and floral designs was superb. The toast, "Telegraphy As It Was," was responded to by J. D. Reid. Mr. Wiley Smith, of Indianapolis, Ind., spoke of the origin of the meeting and traced it to a picture of James Leonard sent to General Stager. The meeting was a most enjoyable affair. Every one regretted the absence of Mr. Charles E. Taylor, who had been so enthusiastic in working up the meeting and who with others sent messages of regret.

There was no meeting in 1881 on account of the death of President Garfield.

The second meeting was at the International Hotel, Niagara Falls, September 20, 1882, with O. H. Booth in the chair. It was not so largely attended as the meeting at Cincinnati. The Military Telegraphers held a meeting at the same time and place and effected an organization with Mr. W. R. Plum of Chicago as president. It was here and then that a union of the two associations was brought about, as so many were eligible to both. Eleven members were added. The names of those who died since the previous meeting were James N. Ashley, B. H. Johnston, James K. Klegg and Alfred Gaither. The officers elected were: President, W. R. Plum, Chicago, Ill.; vice-president, W. B. Wilson, Lancaster, Pa.; secretary, J. C. Mattoon, Baltimore, Md.; treasurer, W. S. Chapman, Chicago, Ill. Chicago was chosen as the place of meeting in 1883. The banquet was at the International Hotel. The association numbered 140 members.

On September 19 and 20, 1883, the Old Time and Military Telegraphers had their meeting at the Grand Pacific Hotel, Chicago. The first business was the election of officers for the ensuing year, which resulted as follows: President, George M. Dugan, Jackson, Tenn.; vice-president, E. Rosewater, Omaha, Neb.; secretary and treasurer, S. B. Fairchild, St. Louis, Mo. St. Louis was selected as the place for the next meeting. General J. A. Logan addressed the Association. Forty new members were added to the list. A water set and tea service were presented to Colonel John C. Van Duzer, superintendent of the United States Military Telegraph during the Civil War. On the way to Chicago the following telegram was sent to Barney Hughes, Memphis, Tenn., urging him to attend the meeting:

"Barney Hughes, Memphis.

"One hundred and forty old timers say for you to meet them at the Grand Pacific Hotel, Chicago, on Thursday. Nothing but a personal apology to each and every one will excuse your non-attendance. Answer on train.

(Signed) "Hogshead, Dugan and Gaston."

This was the answer:

"To Hogshead, Dugan and Gaston, Centralia.

"Would I could gently embrace each veteran. The pleasure is denied me, and I feel a cemetery sensation. May the Lord and land-lord be merciful.

(Signed) "Barney Hughes."

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This was the third meeting of the Old Timers and the first annual meeting of the Military Corps. The members who died since the previous meeting were: John E. Clark, Richmond, Va.; John H. Pierce, Clarkville, Tenn., and Major M. J. Waldron, superintendent U. S. mail service, Memphis, Tenn. The banquet was held at the Grand Pacific Hotel, and after a sail on the lake the party separated.

The fourth annual meeting took place at St. Louis, Mo., September, 1884, at the Laclede Hotel, President Geo. M. Dugan in the chair. Fifty-one members answered the roll call. After the president's address twenty-six new members were elected. Vice-president Rosewater was then called to the chair and made a few appropriate remarks. He presided during the rest of the meeting. O. H. Booth, of Mansfield, Ohio; G. W. Trabue, of Nashville, Tenn., both old time superintendents; also L. M. Paynter, a veteran telegrapher, died during the year.

In the afternoon both associations went on an excursion down the river on the steamer *Charles Morgan*. The banquet was held on the boat. The election of officers for the ensuing year resulted as follows: President, C. W. Hammond, St. Louis, Mo.; vice-president, Charles E. Taylor, Frankfort, Ky.; secretary and treasurer, S. B. Fairchild. Officers of Military Telegraph Corps were elected as follows: President, W. R. Plum (re-elected); vice-president, E. Rosewater, Omaha, Neb.; secretary and treasurer, J. E. Pettit, Chicago, Ill. (re-elected). The convention adjourned to meet in New York in 1885. Number of members, 175.

The Old Time and Military Telegraphers' Association held their fifth annual meeting at the Murray Hill Hotel, New York, August 20, 1885. C. W. Hammond presiding at the Old Timers' meeting, and W. R. Plum at that of the Military Telegraphers. The banquet was held at the Manhattan Beach Hotel, Coney Island, at 8 p. m. An around-the-river and harbor excursion took place the next day on the steamer *Sylvan Dell*, upon the invitation of Comrade Erastus Wiman, a fine lunch being served on board. Seventy-three new members were added at this meeting. Those who died since the previous meeting were: Anson Stager, Chicago; James Partrick, Philadelphia; Charles A. Gaston, Memphis. The officers elected by the Old Timers were: President, James D. Reid, New York; vice-president, C. S. Jones, Chicago; secretary and treasurer, W. J. Dealy, New York. The convention adjourned to meet at Cleveland the third Wednesday in August, 1886.

On August 19, 1886, the two associations met in the Board of Trade rooms, Cleveland, Ohio, J. D. Reid in the chair. Mr. Reid delivered a fine annual address. Fifty new members were elected. Mr. Charles E. Taylor read an address giving an account of the unveiling of James Leonard's monument at Frankfort, Ky., July 29, which was erected by the Old Timers. Mr. C. C. Hine of New York also read an interesting paper. The officers elected were: President, C. C. Hine, of New York; vice-president, Charles E. Taylor, Frankfort, Ky.; secretary and treasurer W. J. Dealy, New York, (re-elected). There was an excursion to Cottage Grove Lake and a banquet at the Stillman House. Philadelphia was selected as the place for the next meeting. Messrs. Dealy, Bruner and Hammond were appointed a committee to revise the constitution and by-laws and report at the next meeting.

On August 17, 1887, the associations met in Philadelphia in the Common Council Chamber. The address of welcome was delivered by W. B. Wilson. President Hine was in the chair and made a good address. The meeting was next addressed by Prof. David Brooks. Officers elected for the ensuing year were: president, Prof. David Brooks; vice-president, Irwin Dugan, Louisville, Ky.; secretary and treasurer, W. J. Dealy. The Military Telegraphers elected officers as follows: President, W. R. Plum; vice-president, Geo. C. Maynard of Washington; secretary and treasurer, J. E. Pettit of Chicago. Chicago was chosen as the next place of meeting. The members visited the Electrical Bureau, the Masonic Temple, the Mint, Wanamaker's store, Ben Franklin's tomb, the Zoological Gardens, etc. Fourteen new members were elected. The banquet was held at the Union League Club.

The Committee appointed to revise the constitution and by-laws reported, and the new constitution was substituted for the old. An excursion was taken on the steamer "Belmont" up the Schuylkill river. The membership now numbered 265.

August 15, 1888, the Old Time Telegraphers and the Society of the United States Military Telegraph Corps, met in annual session at Gore's Hotel, Chicago. In the absence of President Brooks, vice-president Capt. Irwin Dugan took the chair. Chas. E. Taylor, Frankfort, Ky., was chosen president: Day K. Smith, Kansas City, Mo., vice-president: W. J. Dealy, secretary and treasurer, and Louisville, Ky., was selected as the place for the next meeting. The members were invited by Mr. A. H. Bliss to go on 'change and in the afternoon they enjoyed a sail on the lake on the steamer *Josie Dawson*. The banquet was held at Kinsley's and was a most enjoyable affair. Messages and letters of regret were read from W. G. Fuller, W. B. Wilson, Clarence E. Stump, William M. Barr and others. The first toast, "Morse" was responded to by Mr. James D. Reid. W. R. Plum presided at the banquet. The Military Telegraphers re-elected the old officers and the meeting adjourned, each member feeling that nothing had been left undone by the local committee to make it most pleasant for all.

The eighth reunion was held September 11, 1889, at the Louisville Hotel, Louisville, Ky., Chas. E. Taylor in the chair. Resolutions were adopted on the death of George W. McCann of Meridian, Miss., and Mrs. M. H. Ogle who died at her post in the Johnstown flood.

Six new members were elected. The officers elected for the ensuing year were, president, Day

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K. Smith, of Kansas City, Mo.; vice-president, Barney Hughes of Memphis, Tenn.; secretary and treasurer, W. J. Dealy. Kansas City was selected as the place of the next meeting. The Commercial Club took the association around the city in carriages in the afternoon and in the evening a banquet was held at the Louisville Hotel, the decorations being particularly artistic and appropriate. A telegraph instrument at one end of the table connected with the other and messages flew back and forth. Excursions were made to New Albany and to the Mammoth Cave, the party remaining at the latter place over night and returned to Louisville the next day. At an adjourned meeting held at the Mammoth Cave Hotel the Military Telegraph Corps re-elected the old officers. The convention adjourned to meet in Kansas City, Mo., in 1890.

The associations met in their tenth annual convention at the Centropolis Hotel, Kansas City, Mo., September 16, 1890. The meeting was called to order by Wm. Wiley Smith. He introduced Hon. Thomas F. Clohesey, a member of the Missouri legislature and an old time telegrapher, who made the address of welcome, Mr. A. H. Bliss of Chicago responding. Col. Van Horn of the Kansas City *Journal*, was the next speaker. President Day K. Smith then took the chair. A letter was read from Mr. J. D. Reid, then United States Consul at Dumfermline, Scotland, and was answered by cable by the association. A letter of regret from secretary Dealy was read telling of the fire in the Western Union Building in New York in which were destroyed all the records, collections, etc., of the Old Time Telegraphers' Association. Mr. W. H. Woodring, of Kansas City, was appointed secretary pro tem. A letter of regret from vice-president Barney Hughes was read. The committee was not satisfied and sent a message protesting, to which he replied as follows:

"Day K. Smith, President Old Timers.

"Your kind message supported by W. W. Smith and others received. The agony is mine, but sicknesss and absence of clerks excite me. Pity my sorrow."

(Signed) Barney Hughes, Vice-Pres.

Twenty-six new members were elected. Washington, D. C., the third Wednesday in August, 1891, was the place and time selected for the next meeting. Reminiscences by Messrs. Bliss, Crittenden, Lithgow, Follett, Pettit and others were given. There was an excursion to Leavenworth, the Soldiers' Home and Fort Leavenworth. The officers elected for the ensuing year were: President, Geo. C. Maynard, Washington, D. C.; vice-president, D. A. Williams; secretary and treasurer, W. J. Dealy.

The eleventh reunion took place at the Ebbitt House, Washington, D. C., August 19 and 20, 1891. The Old Time Telegraphers were called to order at 10 a. m. and president Geo. C. Maynard read his address. The first business was the election of new members, seventeen being enrolled. Mr. C. M. Heaton, Jr., had the honor of being elected by acclamation. He was then 87 years of age. He began his telegraph career in 1848. As a souvenir of his early work he exhibited the instrument he used when he started telegraphy. The officers elected were: E. Rosewater, Omaha, Neb., president; Geo. M. Dugan, Jackson, Tenn., vice-president, and W. J. Dealy, secretary and treasurer. Omaha was chosen as the place of the next meeting. An earnest appeal was made by the president to collect everything that would perpetuate the history of telegraphy. If the old time telegraphers failed to do this, much of the early history of telegraphy would be lost. The Society of the United States Military Telegraph Corps met at 2 p. m. After the adjournment the members visited some of the public buildings and other places of interest. Everywhere they went they found old time telegraphers. At the White House they met Mr. B. F. Montgomery who had received permission from President Harrison to open the building, which was then closed for repairs. Through the kindness of Mr. S. H. Kauffman, proprietor of the Washington *Star*, also an old timer, the Corcoran Art Gallery was visited and among the pictures which attracted attention was one by Professor Morse representing the Old House of Representatives in 1820. Mr. Kauffman was elected a member of the association. At 8 o'clock the members gathered in the National Rifles Armory for their annual reunion and banquet, President Maynard officiating. There were speeches from the heads of the various Government departments and from all quarters of the country came greetings and congratulations. The clicking of the instrument on the platform made a fitting accompaniment to the speeches. During a momentary lull one of the members in the back of the room jumped to his feet with the remark: "Mr. President, did I not hear the word come on the wire that we were to be connected with the City of Mexico?" He was right, and a moment later a message was clicking over the long circuit. The receiving operator was sitting on the platform with the assistant secretaries of the government departments around him and a delighted audience in front. From the operators in the City of Mexico came the following:

"To the Old Timers and Military Telegraph Corps:

"The operators in the land of the Montezumas send warmest greeting. Buenos Noches."

(Signed) City of Mexico.

When the message was read it was received with hearty cheers. The circuit was then changed at the general office and every minute or two messages were received from different parts of the country. Among them one from Gen. Thomas T. Eckert, A. B. Chandler, James Merrihew, and others. Greetings came from Augusta, New Orleans, Atlanta, Pittsburgh, Chicago, Cincinnati, New York, El Paso, Los Angeles, Philadelphia, St. Paul, Omaha, Buffalo, San Francisco, Ogden,

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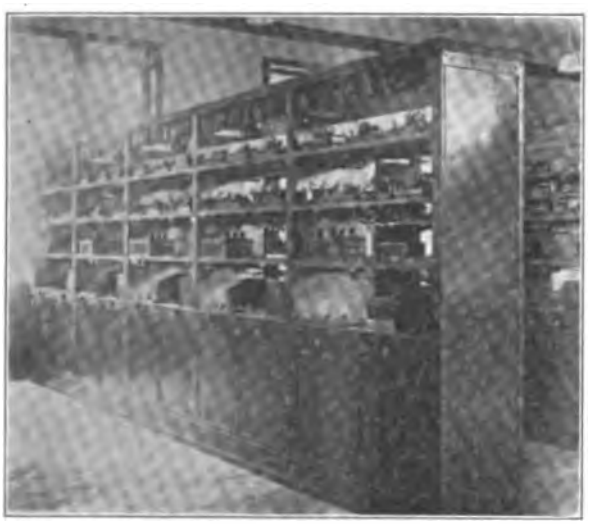
Portland and other cities. Among the speakers of the evening were Mr. M. M. Parker, president of the Board of Trade, Mr. W. W. Burhans, of the United Press, Col. Whitfield representing the Post Office department, Assistant Secretary of Agriculture, Wittels, Assistant Secretary of War, U. S. Grant, Prof. J. E. Watkins of the Smithsonian Institution and Mr. H. B. McFarland. Short talks were given by R. B. Lewis, O. S. Safford, A. H. Bliss and J. E. O'Brien. A paper by Mr. J. D. Reid, one of Morse's early associates was read. It was nearly midnight when the circuit was cut off and the Old Timers left the armory. During the exercises an elegant supper was served. The next morning, Friday, August 21, the members proceeded to Mt. Vernon and a picture of the party was taken on the grounds. A gavel of wild cherry wood grown on the place was bought for the association. The party returned to Washington and most of them left for home that evening, thus ending one of the most enjoyable of all the many pleasant reunions.

The Postal Telegraph Sectional Repeater Table.

BY A. P. ACHIMORE, NEW YORK.

Accessibility, compactness, flexibility and inflammability are the distinctive features of the new unit section repeater tables which the Postal Telegraph-Cable Company has installed in its new Buffalo office and elsewhere.

These tables are constructed of channel, angle and sheet iron and consist of four shelf sections,



VIEW OF SECTIONAL REPEATER TABLE.

each section having at its top a vertical strip upon which is mounted the ground main line and battery switches. Beneath the bottom shelf the wiring cabinet is located.

A unit section will take either two quadruplexes, four duplexes or four repeater sets. The vertical arrangement of instruments is a desirable feature in that it brings all parts of any set within easy reach for adjustment.

The wires connecting the instruments, switches, coils, etc., are carried through the ducts formed by the iron framework. Mounted inside of the ducts, flush with the bottom of the sheet iron openings, are truss rods which insure rigidity and avoid injury to the wires drawn over them.

Instrument interchangeability is a factor well considered. Owing to the narrowness of the unit, all instruments are mounted at the edges of the shelves so that they can be removed and replaced without difficulty.

With the same capacity and length as the old standard repeater tables the new type takes only one-third the floor space.

These tables were designed in the engineering department of the Postal company upon lines suggested by chief engineer Mr. M. M. Davis.

Andrew Carnegie and the Telegraph.

Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, New York, delivered an address on "Andrew Carnegie and the Telegraph" at the banquet on the occasion of the fiftieth anniversary of the founding of the United States Military Telegraph Corps, at Atlantic City, N. J., September 7. He gave a very interesting description of Mr. Carnegie's early career, and his connection with the telegraph.

"Andrew Carnegie," said Mr. Bates, "not only became an expert operator, but he had the student habit—his mind was active, he attended night school, studied grammar and composition, read much and sent letters to eastern newspapers, giving local news. He once wrote to the Pittsburgh *Dispatch*, attacking the rules of Colonel Anderson's semi-public library, signing his letter "A Working Boy." The publication of this letter led to a change in the rules, allowing any working boy to have the use of the library.

"In February, 1853, Col. Thomas A. Scott offered Carnegie $35 per month to enter the railroad service. This increase from $25 was facetiously referred to by Mr. Carnegie years afterwards as the 'best X raise' that had ever been applied to him."

After describing Mr. Carnegie's services during the Civil War and his interest in the telegraph corps, Mr. Bates said that Mr. Carnegie believed himself to be the third person to shed his blood in the Civil War, the two others being enlisted soldiers in the Baltimore riots on April 19, 1861, Mr. Carnegie's sanguinary flow being caused by a broken telegraph wire, which he tried to repair near Washington, springing back and striking him in the face.

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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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - - - *Publisher*
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
R. J. WEEKS, Manager Advertising Department.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

October 1, 1911.

Relations of the Telegraph Companies and Their Employes.

On April 6, 1910, the executive committee of one of the telegraph companies passed the following resolution:

"This committee recommends to the Board of Directors that no increase in the present rate of dividends be made until the plant of the company wherever it may be found necessary, is placed in the highest possible condition, the working conditions of the employes improved and their salaries rearranged, recognizing in this readjustment merit, proficiency and length of service modified by location."

This resolution was adopted eighteen months ago and the question now is, "Has the company carried out the recommendations of its executive committee?" It has had ample time to prove its sincerity, and we do not think that there can be any question that it has lived up to the letter and spirit of the resolution to adjust irregularities in the wage scale and otherwise improve the condition of its employes. In order to do this it has kept its dividend rate down to the minimum point and has endeavored to bring its operating plant and force up to the highest state of efficiency. Salaries have been generally advanced on the basis of merit, proficiency and length of service, and on the whole there seems to be a reasonable degree of satisfaction in the ranks.

From careful inquiries that have been made there is no doubt in the minds of the employes that the telegraph companies have certainly endeavored to treat them fairly and will continue to do everything for their welfare as rapidly as circumstances permit, and it is with much satisfaction that we note this favorable attitude. More gratifying is the fact that the employes not only fully recognize the efforts that the companies are making in their behalf, but are fully disposed on their part to be fair and give full consideration to the fact that their own interests can be best advanced by advancing the interests of the company which employs them.

Everything we have, or can legitimately have, is the result of an equitable division of the fruits of our labor, bearing in mind that it is as necessary to yield to the employer as it is necessary for the employer to yield to the employe, each considering the other's interest, otherwise an equitable basis cannot be established satisfactorily to either party. If this law is kept in mind, much dissatisfaction and unnecessary friction can be avoided. It is therefore gratifying to know that the resolution referred to was adopted in good faith by the company, and that there has been established a strong co-operation between the company and its forces by reason of the fact that the employes have confidence that the company has and will continue to carry out its policy in order that its own interests and the interests of its employes may be further advanced by virtue of the policy outlined in the resolution previously referred to.

The Best Way to Obtain an Increase in Salary.

In these days of competition in business the man with knowledge is the one who is in demand. Knowledge in business is capital, and is just as essential to carry on a business enterprise as is money—one is of little value without the other.

The desire to acquire wealth and power seems to be universal, and it is possible to realize this ambition only by the extension of knowledge. Knowledge, of course, cannot be bought; there is only one way to acquire it and that is by individual study and an equivalent expenditure of mental energy. Knowledge is the lever by which a man can raise his salary. Those who hold positions of prominence and trust in the telegraph and telephone service occupy them by reason of sufficient knowledge to fulfill the duties. If they cannot fill these positions their weaknesses are soon found out and they must step aside to make way for those more competent.

There is no easier way to acquire knowledge than to study, and if a man is not willing to study he should not complain because he is left behind in the world's progress. He that would win a race must run. There are many employes in the telegraph service who would like to occupy higher positions and receive larger salaries but are not willing to exert themselves to attain their ambitions. They sit idly by and see others forge ahead through habits of industry and the improvement of their minds and then perhaps complain that unfair means have been employed against them. The telegraph and telephone companies need men who really know things, and who can prove their knowledge. "By their fruits ye shall know them."

The most effective way for an individual to obtain a greater income is simply to make his services so valuable that employers will bid for them, and this possibility is open to all without prejudice.

We have in mind an instance in New York

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some years ago where an operator fitted himself for a better position by diligent study during spare moments and the burning of midnight oil. He left the telegraph service where he was getting a salary of $80 per month and in two years afterwards was receiving $5,000 a year. Another case is that of an operator who fitted himself for something better and is now general manager of a prominent telegraph company. A great many other instances could be cited where successful and prominent business and professional men began their careers at the key, and by diligent study and close observation have reached the high positions they now occupy.

Again we state that study, with a sincere determination to succeed, will place any man on the road to success. Telegraphers should study their vocation in its technical side so that they will know the reasons for the things with which they are brought into daily contact.

Telephone Pioneers.

The development of the telephone is indeed a marvel in modern industrial history. The growth of the art has been phenomenal and it has all taken place in thirty-five years. A great many of the men engaged in telephone work to-day witnessed the birth of the telephone in 1876 and now they have paused long enough in their activities to realize that they are pioneers in one of the greatest industrial developments the world has ever known. Usually an industry of such magnitude represents the accumulated wisdom and experience of generations, but not so with the telephone. Its wonderful development has been so rapid that most of the pioneers are still alive and they will be heard from after this through the instrumentality of a social organization to be known as the "Telephone Pioneers of America."

The old time telegraphers have a social organization, but practically all of the real telegraph pioneers have joined the great majority. Many of the telephone pioneers have yet many years of useful life before them and in their proposed organization they will derive much enjoyment in meeting and recounting the experiences of the past.

The formation of the society is being attended with much enthusiasm, and the first meeting, which will be held in Boston, November 2, 3 and 4, will no doubt be an extraordinary event judging from the elaborate preparations now being made for it.

The Beginning of the Telegraph.

An interesting contribution to telegraphic history from Mr. Walter Vail will be found on another page of this issue. It gives some details of the early work which perhaps are not generally known and gives the dates of some of the principal events connected with the institution of Morse's first telegraph line. It is amusing at this day instruments the difference is striking in- and Vail on the first line weighed 185 pounds each. It is surprising that they worked at all against such physical odds, but it is a satisfaction to know that one of them has been preserved as a historical relic. Compared with the present-day instruments the difference is striking indeed, but the prototype was no different from its more refined successor in principle.

Instruction in Telegraphy.

A complete course of instruction in telegraphy will be published in these columns, beginning October 16 or November 1. It will be very practical and will meet the needs of telegraphers who are ambitious to fit themselves for advancement in their work. This will be one of the most valuable features ever provided by this journal for the benefit of its readers.

Letter Telegrams in Germany.—Letter telegrams are to be introduced in Germany on October 1. They may be sent at any time between seven in the evening and midnight for delivery with the first mail, between seven and eight the next morning. The cost is 1 pfennig (about one-fifth of a cent) per word, with a minimum charge of 50 pfennigs per message. It will be possible to send a letter telegram of 100 words over long distances for 1 mark (25 cents). The rate is the same for all points in the German Empire.

National Electrical Code.—The 1911 edition of the rules and requirements of the National Board of Fire Underwriters for electric wiring and apparatus is a booklet of 190 pages and covers every application of electricity. Mr. Ralph Sweetland, Boston, Mass., is secretary of the Electrical Committee.

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.

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Recent Progress in Telephone Transmission.

In a paper read before the Philadelphia Telephone Society, Mr. H. Mouradian, engineer, gave some interesting facts regarding recent progress in telephone transmission. Following are some extracts from his paper:

The art of telephonic transmission is considerably more difficult and intricate than the art of power transmission, because we have to deal with a larger number of limiting factors. The limitations in the way of the telephone engineer are many. When speech is transmitted over a pair of telephone wires, the energy gradually dwindles and may be insufficient even to put in motion the diaphragm of the telephone receiver. On what is called a thirty-mile connection, which is generally assumed to be the limit of ordinary commercial transmission, the energy at the receiving end is about 1/1000 part of the input of energy at the outgoing end.

The limitations under which we suffer that do not affect the power engineer are—

1. We cannot raise the energy input at the outgoing end above a certain point without producing interference on adjoining circuits—what in telephone language is termed cross-talk.

2. We have to deal with the dissipation of current as we go along from the transmitting end of the line to the receiving end.

3. We have to transmit a large number of different kinds of speech current, each having a different pitch.

The dissipation of the current as we slide along the telephone line is due to the electrostatic capacity of the line. It is due to the transmission of speech currents from one wire to the other through the medium of the so-called ether in the air. It is the same medium that wireless engineers utilize for transmitting wireless messages. The higher the pitch of the telephone speech currents the more readily they will utilize this medium and the more dissipated will be the telephone current.

I thought I could not present the effect of this factor better than by assuming that it did not exist and estimating the increase in the range of transmission that would be thus made possible. Table I shows this limitation:

TABLE I.

	Present limit.	Limit assuming no electrostatic capacity.
No. 19 gauge cable....	30 miles	130 miles
No. 8 B. W. G. copper wire (non-loaded)...	1,000 miles	3,500 miles

These figures indicate clearly how detrimental to transmission is the effect of capacity. Some means were necessary to overcome this effect, and the answer came in the form of the process known as "loading." It is interesting to note that as early as 1885 Oliver Heaviside had indicated the beneficial results that could be obtained if telephone wires had a larger amount of inductance than they have. He did not show how telephone wires could be made to have a larger inductance. It remained for Dr. Pupin to show us in 1900 the manner in which this could be accomplished.

We owe to Dr. Pupin the following basic ideas:

1. The loading coil—which is an inductance coil—having a closed magnetic core of soft iron.

2. The idea that a non-uniform line made of a uniform line and loading coils inserted at regular intervals depending upon the constants of this uniform line and the amount of loading desired to secure, could be made the equal of a uniformly loaded line, theoretically ideal line, when every foot of line has the same constants as the preceding and succeeding sections of the line of the same length. He not only gave us the tool but showed us how to use it.

Table II shows the increase in efficiency which it has been possible to secure with various types of cable and open wire circuits by the use of loading coils.

TABLE II.

	Attenuation Factors.		Increase in Efficiency.
1. Cable Circuits.	Non-Loaded.	Loaded.	
19 gauge (.080)	1.216	0.31	390%
16 gauge (.072)	0.800	0.19	420%
13 gauge (.072)	0.577	0.13	440%
2. Open Wire Circuits.			
No. 10 B. & S.	0.080	0.035	230%
8 B. W. G.	0.035	0.015	230%
8 B. W. G. phantom	0.029	0.013	220%

The percentage figures indicate also the increase in the range of transmission due to loading.

The progress in transmission made during the last two or three years consisted in:

1. The development of the duplex cable.

2. The development of phantom loading coils for open wire and cable work.

3. The development of porcelain insulators.

4. The loading of submarine cables.

Each of the above items represents an important advance in the art involving a considerable amount of engineering skill and ability. The development of the porcelain insulators represents the real progress made in the extension of the transmission range, while the other items are more significant from the standpoint of better utilization of materials.

In addition to the above the telephone repeater is forging ahead and improvements in the efficiency of our substation apparatus appear certain of realization.

The "duplex" or "phantom" cable is a cable in which the individual conductors are not only twisted together to form a pair, but the cable pairs are twisted together two by two to form a phantom. The two pairs which are twisted together are termed the "side circuits." The two side circuits are given different lengths of twist. The length of twist of a phantom circuit is also different from the length of twist of either one of its two side circuits.

The use of a duplex cable enables us to obtain

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50 per cent. more pairs in the same lead sheath than is possible with ordinary cables. We cannot, however, secure, for the same total number of circuits, a saving of 33 per cent. in first cost, as it is necessary to load not only the side circuits but the phantoms as well. The phantom loading coils cost more than the ordinary loading coils as they have to be made more efficient. In addition when standard common battery supervision has to be furnished over the cable, special composite signaling apparatus is required which still further increases the cost.

The possibility of loading a phantom is easily understood, if it is assumed that in a circuit made of two side circuits, each provided with a loading coil, one-half of the loading coil winding in each side circuit is reversed. A phantom loading coil will therefore have four windings. We will secure the desired result of "loaded" side circuits and "loaded" phantoms by the use of two distinct sets of loading coils,—1. Side circuit coils, 2. Phantom coils.

The presence of side circuit coils is a detriment to the efficiency of the phantom circuit. The presence of the phantom loading coils is a detriment to the efficiency of the side circuits. To reduce the transmission losses due to the simultaneous presence of the double set of loading coils, a new type of side circuit loading coil was designed, which was provided with four windings instead of two—these four windings being associated in such a manner as to eliminate the presence of positive and negative magnetic poles. Side circuit loading coils designed in this manner act practically as non-inductive resistance, so far as the phantom circuit is concerned, and are considerably better balanced than the loading coils used in conection with non-duplex cables. To obtain an economical and well-balanced phantom loading coil the four windings were combined on a single core. Furthermore, application was made of the same principle as followed out in the design of side circuit loading coils—this application resulting finally in phantom loading coils provided with a single core and eight windings.

The new feature in the balancing of the windings of these coils was absolutely essential to the problem of securing phantom loaded open wire circuits which would be reasonably quiet. If it were not for this feature, the loading of the side circuits in the quadded pairs in the New York-Washington cable would have brought in additional transmission losses in the phantom circuits.

Spark Gaps or Oscillators.*

The oscillator or spark gap is one of the most important yet often the most poorly adjusted part of a wireless station.

To obtain a good oscillatory discharge with little damping it is necessary that the resistance of the circuit should be kept low, and since the greatest part of the resistance is in the spark gap it would appear as if this must be very short. While there are reasons for keeping it short there are on the other hand very good reasons why it should not be made too short, and the proper length should be a sort of compromise to be determined by experiment.

If the gap is too short, the discharge will form an arc and the only oscillations taking place will be those corresponding to the frequency of the charging current. Power consumption is also in favor of a long gap, since it causes the induction coil or transformer to draw less current from the line. Another argument in favor of a long gap is the fact that the condenser is charged to a higher voltage and more energy stored up, which makes a greater distance of transmission possible. But as stated (and there always is a tendency for the amateur operator to open out his gap as long as the sparks will continue to jump steadily) the discharge will not oscillate but will merely set up an undirectional current.

There exists a proper gap length for a given circuit which will cause that circuit to emit a maximum amount of energy and which may be determined accurately only by means of a hot-wire ammeter placed in the aerial circuit. The proper gap length is then indicated by the maximum deflection of the meter.

The correct adjustment of the gap may be approximated by the experienced operator. If too short, the spark will be hissing and flaming and is in extreme cases red or yellow colored. It should be lengthened out until it is thick and white and a slight increase in sound is noted. The spark should not be, as commonly thought, stringy and crackling.

Arcing is often caused by insufficient condenser capacity in the circuit. But if the capacity is increased to remedy the arcing, the gap length should also be increased or otherwise the potential of the condenser may not be sufficiently raised to permit a disruptive discharge to take place.

*From "Wireless Telegraph Construction for Amateurs." By A. P. Morgan.

Evening Technical Instruction.—The college of engineering of the Polytechnic Institute of Brooklyn, N. Y., announces for the season of 1911-1912 a series of evening and Saturday courses in engineering, chemistry, physics, mathematics, drawing, history, economics and languages, especially designed to afford men in active practice opportunities for professional study. Among the electrical courses are: electricity and magnetism; electrical measurements; electrical design and electrotechnics, the latter covering electric transmission of intelligence. There are seventy-three courses in all covering the entire range of subjects enumerated. These courses provide an excellent opportunity for telegraph and telephone men to become instructed in the technical side of their work. The Institute has issued a booklet giving full information on the subject, a copy of which may be obtained on application.

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Moral Conception.

BY F. E. D'HUMY, NEW YORK.

Mankind has been endowed with moral conception from time immemorial. Wonderful has been the mental and moral development of man since the time he opened his bewildered eyes to the marvels of this earth; but while advancement has been certain, it has been slow.

Comparing the present generation with the past, the advance may not be discernible, or even when we look back many generations, no distinct line of advance may be discovered. This difficulty of measuring mental and moral development in steps of generations cannot be taken to mean that these endowments are limited in degree and that man's conceptions of morality are the same to-day as those of his cave-dwelling ancestors, and that man many thousands of years hence will possess moral views no greater than those of present life.

Moral advance has been so gradual that it is necessary to take a retrospective view of the subject extending over many generations, to detect the evidence of progression. Advances in ethics come to light more perhaps by changes in customs and the adoption of new laws, or the revision of old ones, than through any other channel. While a change in a custom or the making of a new law may register an advance, it does not necessarily indicate the epoch of such advance. The moral development so recorded is necessarily evolutionary, therefore it extends back to an indefinite period, beginning with immeasureable nothingness.

Advanced we have, and advance we must. It is impossible that we are here for no purpose. Life, thought, time, in fact every conceivable thing or effect, is but a factor and stage in evolution. Evolution means progression.

It is true that general progression may mean the retrogression of some things—the undesirable things—and even the complete obliteration of them, for there is nothing truer than the law of the survival of the fittest.

It is not necessary to look backward to learn that the present is only a link in man's moral progression, for it is evident everywhere on the earth. We find it in comparisons of classes and of races of today. We know that those of cruder moral sense are gradually but surely elevated by contact with those of higher moral sense. If contact be continued over a period of many generations the benefits are correspondingly great and become more firmly established proportionately.

This contact development is most evident to us Americans in the moral change for the better of the negro by association with the white.

The upward trend through the influence of the higher over the lower is evolving universally. Those nations with the highest ethics uplift the nations that are lower in the scale; the communities of a nation having the highest moral sense similarly influence other communities of the same nation possessing a lower moral sense, and so on down to families and to individuals.

Moral advancement thus not only finds its path through group-relation, but also through individual-relation. In fact it has its origin in the latter. The responsibility, therefore, of every human being is very great. This responsibility is greatest in the head of a family, or in any person having influence over others.

It is of extreme importance to the moral advancement of mankind that everyone be made to realize his individual responsibility in this respect. It should be the duty of those controlling publications to continually keep this thought before the public so that it will take root with ever-increasing firmness.

The employer, the corporation head, the corporation chief of department, etc., in fact anyone and everyone in control of employes, whether the number be large or small, is placed in a position of tremendous moral trust.

The moral responsibility toward the employe is no less than the commercial responsibility of the position held. In fact, the successful administration of the position demands that it be equal.

The vast army of workers of the world toil under the direction of leaders variously classified. These leaders carry a very large burden of moral responsibility. The responsibility may be considered proportional to the number of individuals controlled.

The exercise of leadership of any degree, from the administrative heads of a large industrial enterprise down to the minor chiefs of departments, should demand constant care and the exercise of fine judgment in adjusting affairs to equitably distribute the burden of the world's work between the producer and the consumer.

To secure the ideal balance is perhaps the most difficult task confronting those in command of the industrial field to-day, but its nearest approach can be hopefully looked for in the sound development of the so-called trust, which with its well organized technical forces is in a position to make investigations that will determine within a reasonable degree of accuracy the various lines of division involved in such a problem.

A corporation's responsibility is divided between its stockholders, its employes and the consumers of its product. It must purchase the materials it uses at fair rates, it must adjust the compensation of its employes to permit them to live in a degree of comfort that will insure happiness, moral advancement and maximum efficiency, and for this it must exact a fair return. The internal affairs must be such as to eliminate all waste and to secure maximum efficiency in production. Marketing its product or service must involve economic means only so that the efficiencies of production are not unduly counteracted. An expenditure for publicity is essential, but should be no more than that necessary to make known to the public the existence and advantage of the product or services to be furnished. Extravagant displays and exaggerated statements in advertisements are not fair to the consumer, and as moral development in commercialism develops, must

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discontinue. The costs of publicity and marketing should be paid for by the consumer, and in no way by the producer, such as by a condition of cramped dividends to the stockholders or of cramped compensation to the employes.

To the cost of production, publicity, marketing, and insurance, must be added an amount that will give to the stockholders a fair return on their investment. The latter is also a factor requiring the most careful study, for the moral responsibility to the stockholder is no less than it is to the consumer or to the employe. This factor is also one very difficult to determine, as it is dependent on many conditions, such as the value of money at the time of initial investment and of its present value; the degrees of initial and present risk; the period of unearned dividends, etc., and perhaps pluck, and creative and administrative ingenuity may justly come in for consideration.

Every employe should learn to feel his moral responsibility. The part every individual takes in the make-up of a corporation's personnel is important, even down to the lowest employe in the ranks. The moral responsibility of the one at the bottom of the ladder is greater than may perhaps seem to be at casual glance. It is for each individual to find out his own capabilities and capacity, and to then use them to the best advantage for his employer, to a point governed only by the limit of efficient endurance. To secure this ideal the individual must be ever on the alert to see that the methods governed by personal characteristics are netting the best results, and if they are not, to change them by diligently watching self and training accordingly.

As there is always a possibility of one being prejudiced in favor of one's self, it is always safer to give more of one's own effort than what may be believed to be a fair equity for compensation received. To carry such a plan to excess is necessarily evil, as it narrows the opportunities of personal development and takes away from self and one's family the advantages that would otherwise be derived by such development. It is equally unfair to the employer, as it limits the sphere of usefulness to present occupation.

The responsibility of the man in the ranks does not stop here. It also lies in his attitude to others—to the members of his family, his co-workers, his employers and to the consumers of the product he is assisting to create. Much good can be done by the proper attitude and much evil by the wrong.

When the individual emerges from the ranks and finds himself in charge of employes, his responsibilities increase to a point where it will no longer do to merely give good measure of self to be sure one is right, but he must carefully see that an unfair amount is not exacted from his subordinates, yet be very sure that a fair amount is received from them.

Together with the ethical responsibility of apportioning the burdens and fruits of an enterprise among stockholders, employes and consumers, there is the moral effects of personality of each individual that comes in for a very important part and which should be carefully guided so as to reflect good and happiness among all within range.

As the advancement of ethics is made through the channel of contact or environment, the individual can only be successful in his duties to mankind and the world by being considerate of, and kind, upright and just to all with whom he comes in contact, be it relative, companion, co-worker, subordinate or superior. He must not be satisfied to merely affect these qualities but must actually possess them, think and live them, and feel them in his heart. They will then be reflected in others, who in turn will reflect them again, like so many mirrors with ever-multiplying effect. The reflecting power of some of the mirrors may not be very good at first, but their surfaces are bound to become gradually more perfect by the continual impingement of purer rays of thought.

It is thus possible for every one of us to add to the foundation of moral obligations these fundamental principles, upon which will be built the finer superstructure of the perfect man.

Maver's American Telegraphy.

The new and enlarged edition of Maver's "American Telegraphy and Encyclopedia of the Telegraph," known as the 1909 edition, 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 Long Distance Printer, as operated on the lines of the Western Union Telegraph Company, and the Murray Printer, as now used in Europe. 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 to 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 Dividend.—The directors of the Western Union Telegraph Company on September 13 declared the usual quarterly dividend of three-quarters of one per cent., payable October 15.

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Line Conductor Requirements for Telegraph Transmission.

At the recent convention in Boston of the Association of Railway Telegraph Superintendents, Mr. Frank F. Fowle of Chicago read a valuable and interesting paper on "Line Conductor Requirements for Telegraph Transmission." A portion of this paper was printed in our issue for July 16.

The following abstract from the same paper relating to the effects of relay adjustment and the effects of terminal resistance will be read with special interest by practical telegraphers.

EFFECTS OF RELAY ADJUSTMENT.

The ability of an operator to adjust his relay properly for working on low margins is an important factor. This is a matter of instruction and education, primarily, but in order to show its importance the following values of the operative limits with a 10-ohm line have been calculated (see Table I):

An increase in the margin from 12.5 to 15.0 milliamperes, for example, caused by the operator's lack of knowledge or skill, drops the operative limit from

TABLE I.

—Currents, in Milliamperes—			Value	Operative Limit,
Operate.	Release.	Margin.	of n.	in Miles.
50.0	40.0	10.0	5.00	335
50.0	37.5	12.5	4.00	299
50.0	35.0	15.0	3.33	269
50.0	32.5	17.5	2.96	249
50.0	30.0	20.0	2.50	221
50.0	25.0	25.0	2.00	181

299 miles to 269 miles; or a 20% increase in necessary margin shortens the line 10%. Other examples can be easily computed from the table, but the essential point is to secure the lowest possible margin for commercial service.

EFFECTS OF TERMINAL RESISTANCE.

In order to show how the increase of terminal resistance decreases the operative limit, the following calculations have been carried out for a line of 10 ohms per mile, assuming as before that n has a

TABLE II.

Terminal Resistance, in Ohms.	Operative Limit, in Miles.
0	326
100	317
200	307
300	299
400	291
500	283
600	276
800	262

value of 4.00. The results are given in Table II for terminal resistances ranging from nothing up to 800 ohms.

The ideal value of terminal resistance is zero, and a value of 300 ohms cuts down the operative limit from 326 miles to 299 miles, or 8.3%. A resistance of 600 ohms cuts down the limit 15.3%.

In this respect generators are more efficient than gravity batteries, because of their low internal resistance, and in comparing the cost of the two for equal transmission distances, the battery will require a slightly larger wire for equal results and should be charged with the additional cost. This produces a more favorable showing for generators, or dynamotors, than the comparison of actual cost leaving the line out of consideration.

The advantages of generators can be quite largely sacrificed by the use of lamps of unnecessarily high resistance in the taps, and it is important to keep the lamp resistance at the lowest point consistent with safety. Carbon filaments should not be used, because their resistance decreases with the increase of current; iron, on the other hand, possesses the opposite characteristic and is quite satisfactory.

Keeping a Switchboard Dry During a Flood.—During a recent flood on the Allegheny and Monongahela rivers at Pittsburgh, Pa., the private branch telephone exchange switchboard in the Colonial Hotel was threatened by the rising waters. It was placed beyond harm, however, by setting it on some beer kegs that were floating about and later, as the water continued to rise, the board was further "jacked-up" by means of cross arms placed on top of the kegs. In this way the board was kept dry and in an operative condition.

A Few Testimonials.

Mr. W. O. Snyder, a well-known old-time telegrapher, now a resident of Fairfield, Conn., in renewing his subscription writes: "I enclose check for my thirtieth year's subscription. I have watched the growth of the publication from its infancy to maturity, with pleasure and pride, until it really seems that perfection has been reached. Yet I know that a year hence it will be better than now, and that is my earnest hope."

Mr. C. F. Mason, district commercial superintendent of The Pacific Telephone and Telegraph Company, Los Angeles, Cal., in remitting for the renewal of his subscription writes: "You have shown your usual good judgment in renewing my subscription to TELEGRAPH AND TELEPHONE AGE, as the paper is indispensable to a telephone or telegraph man."

Mr. N. E. Smith, superintendent of telegraph of the New York, New Haven and Hartford Railroad, New Haven, Conn., in renewing his subscription to TELEGRAPH AND TELEPHONE AGE writes: "I am very glad you continued my subscription as your publication is of too much interest and value to be dispensed with."

Mr. Chas. E. Stump, manager of the branch office of the Postal Telegraph-Cable Company at 105 Dock Street, Philadelphia, writes: "I enclose you my check for $2.00 to insure me another year of good 'Telegraph News.' Couldn't well do without the AGE after being a subscriber for the past twenty-eight years. Keep it coming."

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The Storage Battery in Municipal Service.*

BY H. M. BECK OF CHICAGO, ILL.

With the adoption of storage batteries in different classes of service, the manufacturer is regularly confronted with the same problem—the difficulty in showing that in the end the most economical method is to give a battery the proper care and operation, even at some little expense, and that this is essential if satisfactory results are to be obtained. The tendency is just the reverse, rather to allow the cells to run just as long as possible without attention, and it has often required a costly experience to bring about the needed reform. The best battery can be ruined in a year, or even less, where it would have given many years of service with proper treatment.

There is a marked difference between a storage battery and apparatus of mechanical nature. When some part of the latter gives out, the whole machine is apt to stop work and necessitates immediate attention. With the storage battery, however, this is not the case. It does not give out suddenly, but will continue to operate long after it should have had attention. If it is allowed to go on working in this condition, however, when it does finally fail, the plates are likely to be seriously damaged, if not ruined.

The characteristics or indications commonly used for governing the operation are voltage, specific gravity, gassing and efficiency. Of these, the first two, voltage and gravity, give by far the most accurate results, and the others are only applicable as checks or where accurate operation is not essential.

Voltage and Gravity.—When charging, the voltage and specific gravity readings gradually increase until the cells are fully charged. They then come to a standstill and will not show any further increase, no matter how long the charge is continued. It is to be especially noted that as long as the cells are taking charge the readings increase, that when the cells are fully charged the readings cease rising, and that the final values reached vary widely at different times. In other words, a battery may be at different times in exactly the same state of charge, although the actual voltage or gravity readings are entirely different.

During discharge the voltage and gravity readings fall. We have learned from experience that it is dangerous to the plates to discharge them below certain values, and these are, therefore, arbitrarily fixed as the minimum discharge limits.

Gassing.—Until nearly charged, the plates absorb the energy put into them with little or no gassing, but, when they are nearly charged, the electrical energy, instead of being "stored," shows itself in the form of more or less violent gassing, the amount depending upon the rate of charge. Gassing should not appear during discharge.

Efficiency.—It is always necessary to put more current into the battery on charge than is taken out on discharge, in order to bring it back to its original condition, the difference representing the loss in the battery and the ratio its efficiency.

While the efficiency varies under different conditions, the variation is not very great for anything like complete discharges, so that knowing what the efficiency is and the amount of discharge we can calculate approximately how much charge is required or how long the charge at any given rate. Under normal conditions, it is found that the charge should exceed the discharge by about 20 per cent.

Summing them up, we have four methods of checking the charge, namely: the rise in voltage, the rise in gravity, the gassing of the cells and the observed efficiency. For checking the discharge, we have the fall in specific gravity and voltage.

There are four points in the operation of a storage battery which must be looked out for, and if these are properly handled no trouble need be expected:

1. The battery must be charged properly.
2. The battery must not be discharged too long.
3. Short circuits between the plates must be prevented.
4. The plates must not be exposed to the air. They must be kept covered with electrolyte and only water of the proper purity used in replacing the evaporation.

Charge.—In the regular operation of a battery, the most important feature is the charging. Experience has shown that when charged too much the excessive gassing washes out the active material of the positive plates and thus decreases their capacity and life. On the other hand, undercharging results in sulphating, lack of capacity and, if carried to extremes, will result in a rapid disintegration of the plates. In order to meet both of these conditions, the best plan is to divide the charges into two types, regular charges and overcharges. Regular charges are simply intended to restore the capacity of a battery after discharge and are given on a very efficient basis, being discontinued, if anything, before the cells are quite full with the object of obviating harmful gassing and overcharging. Overcharges given at intervals of about two weeks are carried to a complete maximum for the purpose of evening up the cells, reducing all the sulphate and keeping the plates in good condition.

Where it is practical to obtain accurate specific gravity readings, these should be used in preference to either voltage, gassing or the efficiency for governing the charge but no matter which method is selected it is advisable where possible to occasionally use the others as a check.

Next to the gravity, the most reliable indication is the voltage. Its advantages have already been stated, namely: that the readings can be obtained at a distance from the battery and the voltage of a small cell can be read as accurately as that of a large.

*Extracts from paper read at the Atlantic City Convention of the International Association of Municipal Electricians, September 12, 13 and 14.

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The greatest objection to the use of the voltage is that the reading is dependent upon the rate of current flowing, and where there is no current flowing, as on open circuit, the voltage readings are of no value whatever; thus voltage can only be used where the current rate is known.

Neither gassing nor efficiency should be considered where accurate charging is essential, as they cannot be depended upon for accurate result. Thus, they should only be used where the cells are very small or the conditions do not warrant the additional expense or labor required for accurate operation.

Gassing does not entail the use of any instruments, which is an advantage, but it does require access to the cells, so can only be used where the cells are within reach.

The efficiency method does not require access to the battery, but it does require an accurate knowledge of the amount of discharge, and this sometimes necessitates extra labor.

As most of you know, this is the method commonly employed in the case of fire alarm batteries. In this service the amount of discharge is constant and quite accurately known, so that no special readings are required in order to determine this. The cells are generally small, too small for accurate specific gravity readings. Their cost is so low that it would not pay to go to any great trouble or expense in order to get accurate operation, and the added life of the plates would probably not compensate for it. Thus, the efficiency method of charging has been selected as being the most suitable, because it is accurate enough for the purpose, the amount of discharge is accurately known, it is exceedingly simple and does not require special trips to the battery room in order to take observations.

Summing up the charge, we have two methods that can be used for careful operation, the gravity and voltage, and two methods which are applicable where less accurate operation is sufficient, gassing and the efficiency, and in each case the decision as to which shall be used depends upon whether the battery is accessible or not. Gravity and gassing require access to the cells; voltage and efficiency do not.

Discharge.—About the only point which has to be guarded against in connection with the discharge is not to discharge too far. To ascertain the amount of discharge or for determining when it should be stopped, the gravity and voltage only can be used, gassing and observed efficiency not being applicable. For indicating the amount of discharge at any given time, the specific gravity readings are the more valuable and, in fact, they constitute a fairly reliable ampere hour meter, the fall in gravity being independent of the discharge rate and almost directly proportional to the ampere hour discharge. It is the common practice in many classes of service to only discharge the cells to about one-half their capacity before charging, the remaining capacity being held in reserve for emergencies.

The voltmeter indicates the limit of the discharge very definitely, provided we know the discharging rate, but it is of comparatively little service in indicating the actual amount of discharge before the limit is reached.

Short Circuits.—For the prevention or detection of short circuits, a regular system of inspections and readings is required. At regular intervals the cells should all be looked over to see that the plates are uniform in color, and that no short circuits are forming, due to the plates shifting and getting together, to deposits lodging between the plates or to the sediment in the bottom of the jars getting up to the plates. Occasionally, when the cells first begin to gas, they should be inspected to see that they all begin to gas at the same time. If any are slow, this is an indication that these cells are falling behind and need attention.

Replacing the Evaporation and keeping the plates covered with electrolyte should be the simplest part of the operation, but for some reason it is one where a large percentage of the mistakes occur. There is a continual evaporation from a battery, and if this is not replaced the electrolyte gets below the tops of the plates. If they are allowed to remain exposed to the air any length of time, they lose their charge and are likely to be injured. As water alone evaporates from the electrolyte, pure water alone should be used for replacing it and not acid or electrolyte. For some reason, there is an idea abroad that the acid evaporates also and must be replaced, and a very great deal of trouble results from this. There is a very slight loss of acid due to other causes, but this is so slight that it only need be replaced ordinarily every couple of years and no trouble would probably result if it were entirely overlooked, as weak electrolyte is not likely to cause any trouble. On the other hand, too strong electrolyte resulting from the continual addition of acid is likely to injure or ruin the plates. The safest plan, therefore, is to use only water, unless acid is lost, as in the case of a broken jar. If you think acid is needed, write the manufacturer and get his advice before doing anything.

Conference on Rubber-Covered Wire.—A conference was held in New York City, August 9, between the Underwriters and the manufacturers of rubber-covered wire, who desired that inspection of rubber-covered wire made under the new National Electrical Code specifications should be conducted on a uniform basis throughout the country. The wire manufacturers insisted that they should have a voice as to the carrying out of the tests on rubber-covered wires. As a result of the conference, the inspection of wires will be undertaken entirely under the supervision of the Underwriters' Laboratories.

Any book on electrical application can be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

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Copper Clad Steel Wire in Overhead Fire and Police Service.*

BY WARREN E. FASTNACHT, CITY ELECTRICIAN, YORK, PA.

The prime requirement in a municipal fire alarm system is reliability of service at all times. Reliability is, therefore, a prime consideration and this means, in overhead work, that wires and cables must have ample tensile strength, with a reserve or margin to insure safety.

In the early days, soft drawn copper and iron were the only materials available in the form of wire, but the poor tensile strength of copper and the poor conductivity of iron made neither one an ideal material. It was recognized very soon that if the high conductivity of copper and the high tensile strength of steel could be combined in one wire, the result would be a perfect conductor for overhead lines. This led to many attempts to use bimetallic unwelded wires of copper and steel, with the numerous failures whose history is well known.

While these attempts were going on, hard drawn copper was discovered, and it seemed for a time that the problem was solved. Experience shows, however, that it was not solved, and we know today that there is a very large field for a wire of greater tensile strength. A few years ago I learned that a successful method of welding copper and steel had been discovered and I looked into it very thoroughly. This wire material is known as copper clad steel. We are satisfied after tests that it is far superior to any other wire manufactured for fire alarm and police service. We now have nine miles of No. 12 in use in York, on the fire and police systems, most of which was used to replace No. 10 B. & S. copper on lines which were the most affected by storms.

The cost of our change from No. 10 copper to No. 12 copper clad was very largely offset by the sale of the old No. 10 at its scrap value. The No. 12 copper clad is not as heavy and was installed with great ease and facility. It can be handled much more readily than copper, which is very likely to break at a small scratch or nick in the surface, while copper clad does not.

The table shows the tensile strength and resistance of copper and copper clad for No. 10, No. 12 and No. 14; also the weight per mile, for bare wire. Copper clad weighs about 7% less than copper, and is about 60% stronger and has 40% of the conductivity of copper in the regular grade.

	Weight per Mile		Breaking Weight		Resistance per Mile	
Size.	Copper.	Copper Clad.	Copper.	Copper Clad.	Copper.	Copper Clad.
No. 10.	.106	154	489	800	5.5	13.7
No. 12.	.104	97	307	510	8.7	21.8
No. 14.	. 66	61	193	330	13.9	34.9

In most signal systems the size of wire is based on its tensile strength only. For example, No. 10 copper is used for overhead lines, while No. 16 copper is ample for the same kind of service underground. The strength of No. 12 copper clad exceeds that of No. 10 copper by at least 4%, while its elastic limit is 50% greater. The resistance of No. 12 copper clad is about four times that of No. 10 copper, or about equal to No. 16, but our experience shows that the resistance factor is unimportant, in comparison with the gain in tensile properties and the reduction of cost. The higher elastic limit is an important advantage because the wire will not stretch under conditions which will cause considerable permanent increase in the sag of copper. This sort of thing reduces the life which copper ought to have, and would have if it possessed more strength. For this reason copper clad can safely be assumed to have a longer life than No. 10 copper, and much less annual maintenance cost, due to avoiding breaks and slack.

No. 12 copper clad will stay up in a storm longer than No. 10 copper for three reasons: First, it has more strength; second, it has a higher elastic limit; and lastly, it has a smaller diameter to catch wind and sleet. The extra battery cost is not significant in comparison with the many advantages which are secured.

In York we place our fire and police wires on 3-foot iron extension arms above all the pole tops, fastened with through bolts, which makes a rigid construction. This permits us to pull our wires up as taut as is safe to have them and where they are copper clad they remain that way. The box leads go down the poles in galvanized iron pipes, each equipped with an insulating joint before reaching the box. This practice reduces our chances for the occurrence of grounds. When police and fire alarm wires occupy the same pole, we use three and four-way extension arms. The saving in maintenance costs we find is an important item. We have not had a single break or case of trouble on our copper clad lines since they were installed. Last winter we had the most severe snow and sleet storms in years and No. 10 copper lines were down in all directions, but our No. 12 copper clad was not affected at all. After the sleet and snow melted, it became as taut as before.

The extra strength of copper clad also helps to hold up the pole line. The local telephone companies whose poles are used by the city appreciate the extra strength of copper clad and have advised us to this effect. The telephone companies themselves are also using the wire, and the York Telephone Company has had eighteen miles of No. 12 in service for several years without one case of line trouble.

*Abstracts from paper read at Atlantic City Convention of the International Association of Municipal Electricians, September 12, 13 and 14.

Mr. A. C. Terry, commercial superintendent, Western Union Telegraph Company, Pittsburgh, Pa., in renewing his subscription says: "Being a telegraph-telephone, or telephone-telegraph man, as you please, and as TELEGRAPH AND TELEPHONE AGE has broadened into a telegraph-telephone paper, I am more interested in its columns than ever before."

TELEGRAPH AND TELEPHONE AGE is the leading paper in these two fields and is progressive and newsy. Subscription price, $2.00 per year.

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A Modern Police Signal System.*

BY J. W. KELLY, JR., CHIEF OF ELECTRICAL BUREAU, CAMDEN, N. J.

It is generally recognized that a reliable, rapid automatic recording and telegraphic signaling system is absolutely essential to secure full efficiency in police departments.

The best system is a combination of mechanical signals, telephones and flash lights. As our police signalling system in Camden is conceded by municipal electricians to be the latest and most up to date in the country, I will briefly describe it and give you some of the results derived from its use. The policemen report once every hour by pulling the mechanical signal in the street box. This is recorded automatically on a tape at headquarters, punching the box number and stamping the date, hour and minute the call is made. If headquarters do not need the officer for anything special, the whole force could report for an entire year without a word having been said. The operator on duty not only gets the report, but the officer knows that he is getting credit for his report by the bell in the street box tapping back in response to the register. If he does not get his tap back he knows that something is wrong with the signal circuit. He can then use the telephone in the street box. Taking the receiver off the hook brings up a red light on the switchboard in front of the operator ,and he then makes his report by telephone. If he cannot get the operator by telephone, he knows that both circuits are out of order and that he must use the ordinary exchange telephone service for his report. While the officer has the door of the box open, headquarters can get him by tapping the bell in the box, but the shutting of the door cuts out the box and the officer would be out of touch for an hour. Here is where the flashlight signals come into play. Distributed about the city at prominent points are red lamps suspended from twenty-two to twenty-five feet in the air. When an officer is needed these lights are turned on by the operator at headquarters and the officer at once calls up for instructions.

The street boxes are equipped with switching arrangements for sending in two duty calls as well as calls for wagon, ambulance, telephone, riot and fire. If the officer has a fighting prisoner, he can call the wagon without unlocking the box, by using his key in a special hole.

The headquarters equipment will receive report calls on eight different circuits at the same time without interference, and give proper credit in each case, distinguishing between duty calls and emergency calls. The duty calls come in without special alarm, but the instant an emergency call starts, a red light is shown and a bell rings calling the operator's attention. A glance at the tape shows what is needed before the box number starts to come in, so that he can signal either the wagon or ambulance to get out for a run. He then sets up the box number on the transmitter and starts it the instant the box number is completed, so that it is possible to have the order to the wagon or ambulance in five seconds from the time that the officer starts to pull the street box. The switchboard is equipped with the proper switches for calling the different stables, without interfering with each other, and similarly the stables can get headquarters without ringing the others.

What is perhaps the most important part of the up-to-date signalling system—the means of reaching the officer on his beat between the times that he is reporting—is the flash light signal. Our flash lights are arranged in circuits of five or more, so that when a circuit is turned on, no matter which way the officer may be walking, there is a lamp ahead of him. We can turn on any combination of circuits from one up to ten and burn them steadily or flash them according to any prearranged code. Some of the light stations are also equipped with bells, and these bells can be rung instead of the light flashed by reversing the current on the circuit. We find that the officers can see the lights quite easily in the daytime.

Some discussion has arisen relative to the best color to use for the flash lights. After experimenting with different colors we found that red was the best; blue lights will not show well at night, and if there are many trees, green cannot be used successfully. If the streets are clear of trees then green is as good as red. The red lights can be seen under all conditions where a light can be seen at all. Our lights are suspended from twenty-two to twenty-five feet in the air, most of them from goose necks fixed to a pole. Some of them are suspended in the centre of the intersecting streets. We use 25-candle power lamps in eight-inch red globes; the bells have double six-inch gongs and we use 110-volt current for both lamps and bells. We get the current from the nearest street lighting circuit, and pay ten cents per month for it. This amount has been fixed for all flash light work in the state of New Jersey.

The Dean system is a two-wire system. When the patrolman wishes to communicate with police headquarters he unlocks the patrol box and removes the receiver from its hook, thus calling headquarters for talking. When he wishes to make his duty call, he pulls down the hook projecting through the inner door. This action on his part sends impulses of current over one of the line wires to the police switchboard. The number of these impulses are so controlled by the box mechanism as to register the number of the box on an automatic ticker-tape controlled by apparatus upon the police switchboard. The telephone and registration circuits are non-interfering. Wagon calls can be sent in by pulling down the hook and pressing a button marked "Wagon."

In the combination boxes the fire key to the box is placed in a small recess covered with a glass plate, and located above the outer door. In case of fire, a citizen can break the glass, use the key to open the box and pull down the hook. The breaking of the glass connects the fire alarm circuit to the box mechanism. Pulling down the hook sends in the alarm to fire headquarters, and at the same time

*Extracts of paper read at the Convention of the International Association of Municipal Electricians, Atlantic City, N. J., September 12, 13 and 14.

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registers it on the ticker tape at police headquarters. As soon as the glass is broken in turning in an alarm from the box the flashlight is turned on in that box and remains lighted until the key has been restored to its position and a new glass put in.

In the Dean system, the flash light is located in the patrol box; it has three lenses and shows a red light.

The Beginning of the Telegraph.

BY WALTER VAIL, OF DEPOSIT, N. Y.

In your issue for April 16 you published an article headed "The Beginning of the Telegraph," in which it was stated that Mr. H. M. Dellinger fitted up the first telegraph office in the world in Washington, D. C. The inference to be drawn from the article is so manifestly erroneous that I desire to submit a few facts regarding the matter.

The first telegraph line in operation was the Paddington and Drayton line in England in 1835, and was thirteen miles long. This antedated the Washington and Baltimore line by nine years.

On March 3, 1843, Congress appropriated $30,000 to build an experimental line between Washington and Baltimore. S. F. B. Morse was appointed superintendent of the construction and Alfred Vail superintendent of the machinery department. Morse's idea was to insulate the wires and put them in pipes, burying the pipes in the ground.

Ezra Cornell went to Baltimore and began, in October, 1843, laying the wires which had been prepared by Morse's assistant, Dr. Fisher. As each length was laid, Vail tested and united the conductors. Ten miles of the under-ground line had been laid when the insulation, which had been gradually failing, disappeared altogether.

In February, 1844, it was decided to place the conductors on poles. Vail and Cornell were employed in the basement of the Patent Office at Washington during March in joining the ends of the wires and making them ready for the poles. On April 1 the stringing of the wires was begun at Washington under the direction of Cornell. One set of apparatus was placed in the capitol and manipulated by Morse, while Vail transported the other set from place to place along the route of the line, and corresponded with Morse as occasion offered. On April 12 the wires were worked successfully for twelve miles. On April 23 Vail substituted the earth for part of the metallic circuit between Blandensburg and the capitol with satisfactory results. On April 30 the line was in operation between Annapolis Junction and Washington. On May 1 the Whig convention met at Baltimore, made its nominations and adjourned. When the train bearing the delegates arrived at Annapolis Junction, Vail went aboard the cars and got the news regarding the nominations at the convention. When Vail had any news to transmit to Morse he gave the signal "48." Morse at the capitol at Washington awaited this signal from Vail and was surrounded by a crowd of the curious who had been informed that great things might be expected to be shown by the telegraph. Suddenly the signal from Vail was heard, and Morse, all excitement and eagerness, bent forward to decipher the characters that appeared embossed upon the little strip of paper as it came from the register. The message at last completed he rose and said: "Gentlemen, the convention has adjourned. The train from Baltimore, bearing that information, has just left Annapolis Junction, and Mr. Vail has telegraphed me the ticket nominated, and it is,"—here he hesitated, holding in his hand the proof of victory of science over space—"it is Clay and Frelinghuysen!"

The work went steadily forward. On May 23 the wires reached the Mount Clare depot in Baltimore and the instruments were set up and operated with gratifying success through forty miles of line. In the afternoon of May 24 the instruments were transferred to the lower depot in Baltimore, in readiness for the regular operation of the line.

These two instruments used by Vail and Morse on this first telegraph line built in the United States were made by a Mr. Stokell from working drawings made by Alfred Vail. They embodied for the first time the beautiful mechanical conception of recording by the indentation of a steel embossing point upon the paper, working in combination with a grooved roller. One of the instruments was used by Morse at the capitol in Washington, the other was used by Vail along the line. Each of these instruments when ready for service weighed 185 pounds. Vail retained the one he used, and before he died bequeathed it to his oldest son, Stephen Vail. It was loaned to and was at the Smithsonian Institute at Washington for many years. It was removed by Vail several years ago, and was finally sold to Hiram W. Sibley, of Rochester, N. Y., who placed it in the Sibley electrical department of Cornell University at Ithaca, N. Y., for safe keeping.

The evidence is conclusive that Mr. Dellinger did not fit up the first telegraph office in the world, because the Paddington and Drayton line in England had two or more offices, also that when the instruments were transferred from the Mount Clare depot and set up at the lower depot in Baltimore, the office was fitted up for the regular business of the line.

Mr. Arthur Walsh, an old time and military telegrapher now of Van Nuys, Cal., in renewing his subscription, says: "You may consider me a life subscriber to your excellent paper. It is with great regret, however, that I read of the numerous deaths among my military telegraph comrades. We are all old men now and, in the nature of things, we cannot hope to live many years more." Mr. Walsh was born in Dublin, Ireland, in 1846, and entered the telegraph service at Cleveland, Ohio, in March, 1862. He did service in the Army in Kentucky and in the Army of the Cumberland under Colonel J. C. Van Duzer during the Civil War.

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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.]

(70) Q. Will you please answer the following questions in regard to the new Postal switchboard described and illustrated in your issue for September 16? C. H. M.

(1) What signaling apparatus is used on the annunciator board? (2) How many wires are provided for in each section? (3) What means are adopted to arrest accidental foreign heavy currents before they reach the instruments? (4) In what respect does the construction of the new board resemble that required for high tension wires? (5) Please explain the functions of the terminal and cross-connecting frames. (6) Is it because slate is a better insulator than wood that it is used in switchboard construction? (7) Could not pin jacks be substituted for the ordinary wedge and spring jack? (8) Explain the system of transfers used in intercommunication between the various sections of the board. (9) Suppose it is desired to connect a wire on the eastern board with one on the southern board, how is it done? Are the connections like those on a telephone multiple board? (10) Is there any particular reason why brass should be used for switchboard work in preference to copper, which I believe has greater conductivity?

A. 1—The type of signaling device used in connection with the annunciator board consists of an interchangeable bell or lamp signal operated by differentially wound magnets. These magnets control shutters or drops, bearing numbers which when operated indicate to the annunciator board attendant what office desires his attention. The main circuits of the annunicators are in series with closed circuit pin-jacks. To operate the annunciator at the main office, the branch office operator "grounds" the loop by means of a switch, this action cuts out one winding of the differential annunciator and allows the magnet to become energized due to the current in the companion winding, thus releasing the shutter bearing the number of the office calling. 2—Fifty main line wires. 3—One-half ampere fuses mounted on terminal frames. 4—In that the iron, slate and other material used in its construction is inflammable. 5—The function of the terminal frame is to act as an intermediate connection between the main line wires where they enter the building, and the switchboard in the operating room. The terminal room equipment is in reality a switching system, practically a duplicate of that installed in the main operating room, but constructed with the object of providing for flexibility and utility rather than for fine appearance. The many advantages of having a complete switching system close to the point where lines enter the building from underground and aerial cables, are obvious. The function of the cross-connecting frame is to act as an intermediate connection between the pin-jack and spring-jack connections of the switchboards, and the instruments located on operating tables. 6—Not directly but better insulation is secured by using mica bushings. The slate is non-inflammable and non-shrinkable and thus permanently retains the alignment of the parts mounted upon it which is not the case with wooden boards. 7—They could be, and the Postal engineers have utilized thousands of such jacks in place of spring-jacks as formerly employed in telegraph switching. It has, however, been found that the spring-jack which permits the insertion of several wedges in various relations to each other meets main-line telegraph switchboard requirements better than the pin-jacks. With four wedges involved, eight pin-jacks would be needed to make all the combinations that can be made with one spring-jack. 8—Pin-jacks properly marked are mounted on each section of the board and are connected with similar pin-jacks in each of the other sections. That is, each section has several possible direct connections with each other section of the entire board. 9—To operate the transfers the attendant uses a single cord equipped with a wedge at one end and a plug at the other end, the wedge is inserted in the spring-jack of the wire to be transferred while the plug end is inserted in one of the pin-jacks leading to the section to which the wire is to be transferred. At the distant section the wire is picked up through the pin-jack bearing the corresponding number. 10—On account of the comparatively large dimensions of the metal parts employed in switchboard construction, the question of the relative conductivity of brass as compared with copper is unimportant. From a mechanical standpoint brass is superior to copper as it can be worked to better advantage and it wears much better.

Memorial to Volta.—Signor Calissano, Italian Minister of Posts and Telegraphs, accompanied by telegraphists who had assembled at Como from all parts of the world, on September 1 visited the grave of Alessandro Volta, the inventor of the electric battery, at Camnago. The minister and delegates placed wreaths on the tomb, and speeches were made by Signor Calissano, Signor Battelli, a member of the Italian Chamber, M. Buels, director of the Belgian Telegraphs, and Signor Pietro Volta, a nephew of the inventor. A memorial stone was unveiled bearing an inscription recording the esteem in which Volta is held.

Cupid and Mercury.—A 63-year old Western Union Telegraph messenger in Kansas City, Mo., was married recently.

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The Railroad.

Mr. Fred Kuehn of the telegraph department of the Lake Shore and Michigan Southern Railroad Company, Cleveland, Ohio, was a recent New York visitor. He was accompanied by his wife.

Change of Headquarters.—The headquarters of Mr. C. W. L. Mickley, superintendent of telegraph, International and Great Northern Railroad Company, have been removed from Palestine to Houston, Tex.

Telephone Dispatching on Rock Island.—The Chicago, Rock Island and Pacific Railway will equip its Kansas division with forty-two Western Electric selectors for telephone train dispatching. The new circuit will run from Caldwood to Belleville, Kan., a distance of 210 miles. The dispatcher will be located in the middle of the line at Herrington, Kan.

Proceedings of Convention of Railway Telegraph Superintendents.—The proceedings of the annual meeting of the Association of Railway Telegraph Superintendents, held at Boston, Mass., June 26, 27 and 28, have been issued in the usual form. The rapid growth of the work of the association is indicated by the fact that the bound volume contains 331 pages. The work was produced under the immediate supervision of Secretary P. W. Drew.

Meeting of Railway Telegraph Superintendents.—Owing to the unavoidable delay in issuing the proceedings of the annual convention of the Association of Railway Telegraph Superintendents at Boston in June, it has been decided to omit the usual September meeting of the Western Division of that association. Plans are under way to hold a joint meeting of the Eastern and Western Divisions in Chicago on November 23 and 24. Members desiring to introduce any subject for discussion at that time should communicate with Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railway, St. Louis, Mo., who is chairman of the Western Division.

Railway Telephone Train Dispatching.

The Chicago, Milwaukee and St. Paul Railway Company has ordered of the Western Electric Company seventy-five telephone selectors for use on its Hastings and Dakota division. Three circuits will be installed, the total mileage being about 390 miles. No. 9 B. & S. copper will be used on all three circuits.

The Atlantic Coast Line has placed an order with the Western Electric Company for ninety station telephone train dispatching outfits, which will be used to equip 235 miles of track. A train, a message and a block circuit will be installed between Savannah, Ga., and Jacksonville, Fla., with a branch from Jesup to Waycross, Ga., and from there back to Folkstone, Ga., where it will meet the main line. The train dispatcher will be located at Savannah.

The Turner Monument Fund.

We give herewith a view of the bronze tablet that is to be set on the face of the monument to be erected at Harriman, N. Y., (formerly Turner) and unveiled in November, to commemorate the sending of the first telegraphic train order.

The tablet was designed by Mr. Charles Keck, of New York, the well-known sculptor, and, as will be seen, is a handsome and artistic piece of work. It is six feet high by three feet, three inches wide, and is composed of United States standard bronze.

VIEW OF BRONZE TABLET FOR TURNER MONUMENT.

It will be cast by the Gorham Company, and will be ready about the first week in November.

The vignette of Mr. Charles Minot, at the head of the tablet, is a faithful likeness of the subject and is artistically executed.

The design of the tablet as a whole is both artistic and emblematic of the telegraph. The source of electric current and the means of utilizing it are faithfully represented, and the historical message, the sending of which is to be commemorated by the

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monument, is shown in embossed characters on the tape delivered by the old-time Morse register.

The stone monument will be furnished by Mrs. E. H. Harriman, of Arden, N. Y., at her own expense, and is being cut and erected under the supervision of Mr. C. T. Ford, of Central Valley, N. Y., superintendent of the Harriman estate.

The committee is at work on the plans for the dedicatory exercises. Mr. Henry D. Estabrook, of New York, has been chosen to make the address at the unveiling, and, as was announced in these columns September 16, Miss Gertrude M. Griffith, daughter of Mr. E. P. Griffith, chairman of the Monument Fund, has been unanimously selected to unveil the monument.

The ceremony will take place about the middle of November, and it is expected that a large and representative party will be present to do honor to the memory of Mr. Minot and his historic achievement.

The Fund committee desires it to be understood that those who wish to contribute toward the fund have yet an opportunity to do so. Mr. J. B. Taltavall, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, is the treasurer, and all contributions are acknowledged in these columns.

The contributions received up to date are as follows: Previously acknowledged, $1,672.49; W. L. Ives, New York, $1.00; F. J. Hickey, New York, $1.00; F. J. McKenna, Pittsburgh, Pa., $1.00. Total, $1,675.49.

Telephone Pioneers of America.

A new list of members of the association of Telephone Pioneers of America will be issued about October 1. With it will be mailed a beautiful badge adopted for the Boston meeting on November 2, 3 and 4. The name of each member receiving a badge will be printed across the face of the ribbon in gold letters. These badges will be in the nature of souvenirs of this, the organization meeting of the association.

Mr. Frank W. Harrington, a well-known old time electrical man, helped in the work of manufacturing the original Bell instruments in Boston in 1871, and he has applied for admission to membership.

The association now has over 400 members, including eleven women, who entered the service in 1882 and 1883. The list of members at the present time shows three who began in 1875 and twenty-five in 1877. The maximum number registered in any one year is 48, which was in 1879.

It is proposed to request all members to bring to the Boston convention any matter of an interesting character for the exhibition, for which proper provision will be made.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company, is taking an active interest in the association, and Mr. Angus S. Hibbard, of his personal staff, is in charge of the details for the entertainment at Boston.

The Press Committee consists of Mr. Henry McDonald, of the American Telephone and Telegraph Company, and Mr. J. H. Barry, of the New England Telephone and Telegraph Company, Boston, Mass.

The committee of arrangements is composed of Messrs. Henry W. Pope, Charles R. Truex and Thomas B. Doolittle, 15 Dey Street, New York.

Radio-Telegraphy.

Marconi Wireless in Canada.—At the annual meeting of the Marconi Wireless Telegraph Company of Canada, at Montreal, on October 5, the stockholders will be asked to approve the creation and issue of $2,500,000 30-year first mortgage six per cent gold bonds, for the purpose of placing the finances of the company on a sound basis.

Large Wireless Towers in Washington.—What is said will be the largest wireless towers in the world are to be erected at Washington, D. C., for the Navy Department. There will be three of them and they will be known as the Arlington towers. They will be 600 feet high. The range of the station will be fully 3,000 miles, and it is expected to have it completed next March.

Examination for Wireless Operator.—The United States Civil Service Commission, Washington, D. C., announces an examination on October 4, at various cities throughout the country, to secure eligibles from which to make certification to fill a vacancy in the position of electrician and wireless telegraph operator at a salary of $900 per annum, for duty in the lighthouse service in the Territory of Hawaii, and vacancies requiring similar qualifications as they may occur. As considerable difficulty has been experienced in securing eligibles for the position mentioned, qualified persons are urged to enter this examination. Applicants should apply to the United States Civil Service Commission, Washington, D. C.

Death of Paul Hoenack.

Paul Hoenack, probably the most expert and experienced mechanician in the manufacture of telegraph apparatus in this country, died at his home in New York City August 4 of heart failure. Mr. Hoenack was born at Soma, Prussian Germany, in 1840. He learned and worked at his trade in Siemen Halske's works in Berlin; thence he went to England, where for some years he was in the employ of Elliott Brothers, coming to America in 1865 and entering the service of the Western Union Telegraph Company under the personal supervision of Mr. Phelps, inventor of the Phelps "combination" printing instrument. In 1878 Mr. Hoenack established a small shop of his own. His first work was on the McDonough telephone and various experimental modifications for demonstration before the courts in the protracted litigation with the Bell Company. Among his patrons were many of the most prominent inventors in electricity. Mr. Hoenack's work covered the entire field of cable, synchronous, multiplex, stock quotation, printing and rapid automatic telegraphy. Throughout his long business career he was trusted and respected by those whose secrets were fashioned in his shop.

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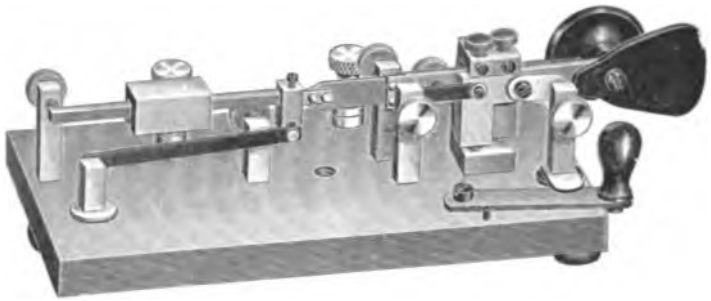

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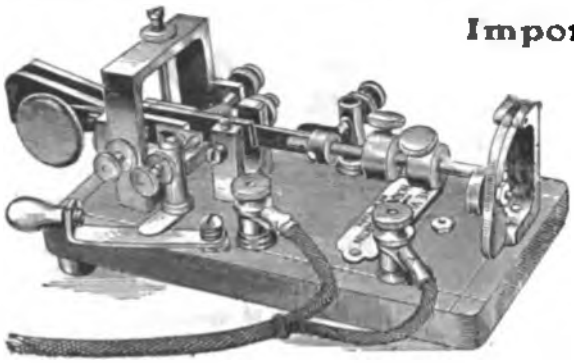

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Testing Apparatus. — Foote, Pierson & Co., New York, makers of electrical measuring and testing instruments, have put upon the market an improved portable switch testing set, which is stated to be easy to use and accurate within one-tenth of one per cent. It is recommended for telegraph and telephone service and is a very compact piece of apparatus. See their advertisement on the last page of the cover.

Telephone Train Dispatching in Hudson Tunnels.—The Pennsylvania Railroad Company has recently ordered fourteen standard Western Electric selectors for use in its Hudson tunnels, New York. The section equipped is nine miles in length. In addition to these selectors, fourteen special six-line test boards have been ordered. There will also be thirteen ten-line jack boxes, which will be used for blocking purposes.

Selector Equipment for the Atchison.—The Atchison, Topeka & Santa Fe Railway has had over 500 Gill selectors in use in its telephone train dispatching circuits for several years past. This company is extending its telephone dispatching system and has placed an order with the United States Electric Company of New York for fifty-five Gill selector equipments of the local battery bell type, with dispatchers' calling outfits for the new circuits.

Meeting of Western Union Managers.

The managers of the seventh district of the Western Division of the Western Union Telegraph Company held a meeting at the Gibson House, Cincinnati, Ohio, September 8 and 9. District commercial superintendent I. N. Miller, of Cincinnati, delivered the opening address. Other addresses were made as follows: "Moving Business," by A. A. Montgomery, district traffic superintendent, Cincinnati; "Courtesy," by F. H. Wolfe, manager Shelbyville, Ind.; "Quick and Correct Service the Best Solicitor," by E. H. Cost, manager, Xenia, Ohio; "Soliciting Business"—dialogue, by Messrs. R. C. Bliss and W. W. Browne, managers of the Cincinnati and Dayton, Ohio, offices respectively; "Messengers—How to Secure Them," by E. D. Keyes, manager, Hamilton, Ohio; "The Relations of the Telegraph to the Newspaper," by L. R. Scholl, Cincinnati, Ohio; "The New Features and Creating New Business," by S. M. Dunlap, manager, Columbus, Ohio. Other topics discussed were: Is the Telegraph Popular?, Breaking the Ice, Forms 219, 219a, Attended Pay Stations, Claims of Telephone Company Collecting Western Union Bills, Condition of Offices Handling More Business by Telephone, Condition of Instruments, Joint Offices with Bell Companies, Labor Laws, Class "A" Offices, Errors and Causes, Timing Messages, Signs, Miscellaneous.

A banquet was held at the Gibson House in the evening of September 8, after which the party reviewed the parade in celebration of the Fern Bank Dam across the Ohio River a few miles below the city. The afternoon and evening of September 9 were spent in sightseeing.

Those present were: M. T. Cook, division commercial superintendent, and R. W. Whitehead, division plant superintendent, Chicago, Ill.; E. Parsons, district plant superintendent, Indianapolis, Ind.; A. A. Montgomery, district traffic superintendent, Cincinnati, Ohio; A. R. McGrath, commercial agent, Chicago, Ill., and the following managers: G. C. Lemon, Athens, Ohio; Miss Clara Frazer, Aurora, Ind.; S. M. Dunlap, Columbus, Ohio; R. C. Bliss, Cincinnati, Ohio; G. B. Schaeffer, Chillicothe, Ohio; Miss A. B. Sprague, Connersville, Ind.; W. W. Browne, Dayton, Ohio; I. E. Ward, Findlay, Ohio; C. E. Eckert, Greenfield, Ohio; E. D. Keyes, Hamilton, Ohio; C. Waidelich, Lancaster, Ohio; G. E. Balsley, Lawrenceburg, Ind.; H. L. Clark, Marietta, Ohio; J. S. Todd, Middletown, Ohio; R. L. Rhodes, Newark, Ohio; G. R. Lockwood, Portsmouth, Ohio; F. H. Wolfe, Shelbyville, Ind.; T. E. Jones, Springfield, Ohio; R. R. Miller, Troy, Ohio; J. R. Clark, Vincennes, Ind.; E. H. Cost, Xenia, Ohio; C. E. Jones, Zanesville, Ohio. Among others present were: L. R. Scholl, H. H. Driehaus, F. O. Miller and Miss A. L. Madden, all of Cincinnati.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, WESTERN UNION.

Mr. C. B. Wood, in charge of the messenger boys in this office, and who was one of the most indefatigable workers to make the Old Timers' reunion at Atlantic City a success, has been seriously ill at his home in Palmyra ever since the convention. He is suffering from a general breakdown from overwork.

Mr. W. C. Shugar, night chief; Mr. J. V. Burger, wire chief, and Messrs. J. T. Wilde, E. V. McElroy, E. Truitt and John Truitt, traffic chiefs, have returned from their vacations.

Mr. E. A. Dos Sandos, all-night chief, is now on his vacation. Mr. E. L. Maize, assistant wire chief, spent a very pleasant holiday at Atlantic City during the Old Timers' reunion.

John Roddy, aged 40 years, who was connected with the Western Union service in this city for twenty-nine years, died suddenly recently.

Among recent marriages here were Mr. Conrad Walter of the Easton, Pa., office, to Miss Mary Long of this office, and Mr. R. J. Waddams of the Atlantic City office to Miss Mary A. Fitzgerald of this office.

Mr. Edward J. Smith, who has been claim agent for some time past, has been promoted to the assistant managership of this office.

RICHMOND, VA., WESTERN UNION.

During the Beattie murder trial at Chesterfield courthouse which lasted from August 21 until September 8, this company handled some 960,000 words of press matter. The large newspapers of the East and the press associations had special

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representatives on the ground to the number of about thirty, and in order to handle their matter eight wires were strung along the country road between Centralia and the courthouse and an office was opened in a store building about one hundred feet from the courthouse proper. All of the press matter was handled from this office except on the last day of the trial when an instrument was installed in the courtroom so that the jury's verdict could be flashed to the outside world the moment it was rendered. The arrangements throughout were necessarily crude, but it is a notable fact that the correspondents had naught but words of commendation for the service that was given them. The jury's verdict of "guilty" was in the offices of newspapers a thousand miles away as soon as the words were uttered. The clatter of telegraph instruments caused much astonishment on the part of the natives of the peaceful little country village and it is doubtful if Chesterfield will ever again be the scene of so much bustle and activity. The correspondents and their interests at the trial were looked after by district manager J. S. C. Murphy and the operators and circuits were under the supervision of chief operator F. R. Veale of Richmond. The following operators from Richmond were assigned to duty at Chesterfield: C. M. Rosson, F. A. Browning, S. S. Hart, H. L. Hudson, B. B. Lytton, L. R. Sexton and O. H. Peacock.

Meetings of the electrical class were discontinued during the Beattie trial and will not be resumed until cool weather.

OKLAHOMA CITY, WESTERN UNION.

Manager H. G. Robinson has returned from Colorado.

Mr. H. K. Pottenger, formerly of the "Frisco" at Sapulpa, Okla., has been appointed day wire chief and Mr. J. F. Slack night wire chief.

Among the late arrivals are, Mrs. E. E. Tracey from St. Louis, Mo., Mr. C. M. Laurendine from Mobile, Ala., and Mr. W. L. Germany from Dallas, Tex.

The personnel of this office at present is: Mr. H. G. Robinson, manager; Messrs. E. E. Lash, chief, days; G. C. Moeser, day traffic chief; H. K. Pottenger, day wire chief; R. N. Long, night chief; J. F. Slack, night wire chief, and L. J. Tucker, all-night chief.

This office is equipped with a full dynamo plant using three potentials and a pair of local machines. Six quadruplex sets are employed and some Atheam quadruplexes are to be installed soon. A system of loops to the *Oklahoman* office is maintained. Mr. M. C. Harper is manager at the *Oklahoman* office.

The great telegraphic song hit, "SEND ME A NIGHT LETTER, DEARIE." Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.

B. L. BRANNAN,
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The closing of the night offices in this district is causing considerable overtime in the early morning occasioned by an overflow of night letters. All telephoning is done from this office for the entire state.

Mr. Votaw of this office was one of the musicians who took a prominent part in the recent annual reunion of the Spanish-American War Veterans in this city.

GAINESVILLE, TEX., MACKAY.

The force of the Mackay Telegraph and Cable Company at Gainesville, besides manager W. Dalton, consists of Mr. Arthur Parte, operator; W. Henderson and Arthur Allagood, messengers.

T. M. B. A. Assessment.—Assessments Nos. 529 and 530 have been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Ellis H. Holroyd at Chicago, Ill., William O'Niel at Belvidere, N. J., Morton W. Courtright at Chicago, Ill., Robert Stimus at Moorestown, N. J., Edgar H. Brown at Chicago, Ill., Frank B. Williams at Louisville, Ky., Edwin Butler at New York, John E. Tyrrell at Jackson, Mich., Anthony F. Saunders at Kansas City, Mo., Christopher Reilly at Memphis, Tenn., Walter D. Francis at East Orange, N. J., Henry Griffith at State Sanitarium, Md.

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.

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Telegraph and Telephone Age

No. 17. NEW YORK, OCTOBER 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Loop, Cord, Wedge and Jack Troubles—A Hint to Linemen.

PART I.

One would naturally suppose that because branch office loops are short compared with the lengths of main line conductors, the number of "openings" and other interruptions to their operation from which we suffer almost daily, should be diminished in like proportion. As a matter of fact, however, notwithstanding the conductors of such loops are mainly underground circuits and therefore not liable to be broken, the reverse of this order obtains.

Another thing a layman would hardly suspect is that probably 80 per cent of all the interruptions to loop operation occur on grounded or duplex loops; that is to say, loops connected with multiplex circuits.

Single line loops seem to be comparatively free from interruptions, although in many instances they parallel the duplex loops that bother us in the same cable and are placed in the same branch office switchboard.

The explanation is that, although the single line loops may be subjected to many of the identical trouble-contributing influences which are fatal to the operation of duplex loops, the higher E. M. F.'s provided to furnish current for the former are able to break down and thus override many of the situations which the lower pressures of local batteries are not able to cope with.

This fact certainly presents the strongest kind of an argument in favor of employing higher E. M. F.'s, on multiplex loop local circuits, and the idea becomes still stronger as we note the number of peculiar sources of little troubles the average lineman finds almost impossible to locate.

SPRINGJACK DEFECTS.

As "loop trouble" embraces all the defects of the apparatus and paraphernalia with which the conductors proper are connected, we will discuss them separately, beginning with the springjacks in the switchboard.

Now a springjack, as everyone knows, is about as strong and substantial a piece of apparatus as one could desire, and for that reason is often unsuspected as a source of trouble, which may exist for a long time before suspicion is finally directed to it.

If the lineman finds the tension spring normal and wire connections good, as he usually does, he reports "no trouble there," and returns without having accomplished anything, but under the impression that he was given a wrong clue. In the meantime the loop interruptions continue at frequent intervals daily.

The particular defect we wish to call attention to, and which the linemen cannot see, and therefore do not suspect, is a rusty or worn hingepin, and when this happens there is but one remedy, viz., remove the jack bodily from the board, take out the pin and replace it with a new one that is bright and clean. In nearly every case where this method is followed the trouble will cease at once.

This defect should always be suspected where loops close simultaneously with the insertion of the branch office test set at the switchboard or by otherwise altering the position of the wedge.

Of course a loop may open temporarily owing to the presence of a particle of dust having settled between the lips and edge of the wedge, which by the insertion of the test wedge may have been removed. For this and other reasons a defective pin is usually not suspected, especially when one finds it impossible to reopen the circuit by altering the position of the wedge for the purpose of locating the fault. But do not be deceived; remember the old saying, "a watched pot never boils." Your remedy is this—when these loop openings have occurred daily for sometime, while all the connections appear normal, yet the line closes when you cut in at the board, remove the jack at once and overhaul it.

Recent experience with defective loops has demonstrated conclusively the fact that nearly all old or much used switchboards contain one or more springjacks that cause trouble daily in the manner described and linemen should attach more impor-

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tance to the contention that frequent overhauling of the jacks should be the rule instead of the exception.

LOOSE CONNECTIONS.

Another quite common defect in a springjack is the opening of a duplex loop on the receiving side. This is usually caused by the nut which holds the wire fast to the brass plate, or under lip of the jack, becoming loosened. This should be the first point examined when seeking the source of the trouble. It is caused by the hammering of the upper lip on the brass plate beneath whenever a wedge is suddenly withdrawn. In the course of time the nut becomes loosened, especially after the wood warps, and the receiving side loop conductor makes an imperfect contact with the under lip. It is obvious, therefore, that these small nuts should be examined regularly at frequent intervals, instead of waiting until the loop opens.

The sending side, or upper lip connection, is not so likely to work loose, as a much stronger means is used for connecting the conductor, yet it should receive proper inspection now and then.

(To be continued.)

Recent Telegraph and Telephone Patents.

ISSUED SEPTEMBER 19.

1,003,476. Telephone System. To A. D. T. Libby, Elyria, Ohio.

ISSUED SEPTEMBER 26.

1,004,038. Printing Telegraph. To C. L. Krum, Chicago, Ill.

1,004,290. Telephone system. To C. W. McKibben, Beaumont, Tex.

Personal.

Mr. E. A. Chenery, superintendent of telegraph, Missouri Pacific Railroad, St. Louis, Mo., was a recent New York visitor.

Dr. K. G. Frank, American representative of the Siemens & Halske Electrical Works, Berlin, Germany, has returned to New York after an absence of several months in Europe.

Mr. Norman Harrison chief engineer of the General Post Office, Johannesburg, South Africa, is in the United States on a trip of inspection of the telegraph and telephone systems, and is at present in New York.

Mr. Frank B. Knight special agent in charge of publicity, Southwestern Telephone and Telegraph Company, Dallas, Tex., and an old-time telegrapher, arrived from Europe on October 10 after an absence of several months.

Dr. Adolph Franke and Dr. Eberling, of the Siemens & Halske Electrical Works, Berlin, Germany, have arrived in New York and will spend a few weeks inspecting telegraph, telephone and other electrical interests in this country.

Mr. Francis W. Jones and Mrs. Jones, of Central Valley, N. Y., have gone to West Palm Beach, Fla., to spend the winter. They were accompanied by Miss Alice Le Bel, of Quebec, Canada. Mr. Jones was formerly electrical engineer of the Postal Telegraph-Cable Company, New York.

Colonel Robert C. Clowry and party returned from Europe on October 3, having been absent ten weeks. They motored through England, France, Switzerland, Austria and Germany. The roads were in splendid condition and the hotel accommodations excellent. The Colonel met a great many old friends from America on his tour, including Mr. Thomas A. Edison, with whom he had a jolly meeting in Paris and Berlin.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. C. Adams, second vice-president of this company, has returned from a trip of several weeks in Europe.

Mr. D. McNicol, of the electrical engineer's office, New York, is in Chicago on business connected with the engineering department of the company.

Mr. W. C. Lloyd, manager at New Orleans, La., has been advanced to be superintendent of the third district, of the Southern Division, with headquarters at Atlanta, Ga., vice C. B. Arrington, resigned.

Mr. Nelson E. Church, formerly manager of the Western Union Telegraph Company at Pittsburgh, Pa., has been appointed manager of the New Orleans, La., office of this company, to succeed Mr. W. C. Lloyd.

Mr. C. M. Baker, division general superintendent of plant at Chicago, is seriously ill at Galveston, Tex.

Mr. C. C. Ramsay, manager of the Portland, Me., office of this company and Mr. P. J. Farrel, quadruplex chief of the Boston office, were recent executive office visitors.

Manager W. C. Lloyd Advanced to a Superintendency.

Mr. W. C. Lloyd, superintendent of the third district, Southern Division, of the Postal Telegraph-Cable Company, with headquarters at Atlanta, Ga., is a native of Alabama, being born at Bladen Springs, Ala., August 15, 1872.

At sixteen years of age young Lloyd began life as a messenger at Waynesboro, Miss. Acquiring the ability to telegraph, he found employment for a number of years in the railroad service at various points in the South. His first engagement in the commercial service as an operator was with the Western Union Telegraph Company at Eufaula, Ala., and afterwards at Atlanta, Ga. In 1896 he went with the United Press at Columbus, Ga., but the failure of that concern in the year following resulted in Mr. Lloyd's becoming identified with the Postal at Birmingham, Ala., in the employ of which company he has since remained, his career therein being marked with steady advancement. From the position of operator, he was promoted to be chief operator at Vicksburg, Miss., thence being

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transferred to the Memphis office as all-night chief. Then he was sent back to Birmingham to fill the position of night chief, but was soon returned to Memphis as chief operator. A year later he was promoted to the managership at Memphis in which position he remained for two years. In June, 1908, Mr. Lloyd was appointed manager of the New Orleans office which position he held at the time of his recent appointment as superintendent at Atlanta.

W. C. LLOYD,
Superintendent Third District, Atlanta, Ga.

Mr. H. R. Waterbury, whose appointment as manager of the Jacksonville, Fla., office of this company was announced in the September 16 issue, was born in Greenwich, Conn., thirty years ago, and learned telegraphy in 1901 while working as a reporter for the *Daily Advocate*, of Stamford, Conn. His first telegraph position was in Waterbury, Conn., and afterwards he became manager of the Postal Company's office at South Norwalk, Conn. Leaving this position, he joined the United States Signal Corps and after a seven-months' course in cable work at Washington, D. C., he was detailed to the United States cableship "Burnside," engaged in the laying of the Alaska cable. Upon the completion of this work he was stationed at the Juneau, Valdez and Seattle offices successively and was discharged in 1906 with the rank of sergeant. Mr. Waterbury then returned east and worked for the Postal Company in New York, afterwards, in 1910, going to Jacksonville for the same interests, where he filled the positions of branch manager and cashier.

H. R. WATERBURY,
Manager, Jacksonville, Fla.

An Old-Time Telegraph Construction Foreman.

One of the most prominent linemen in the Postal Telegraph-Cable Company's service is John R. Gorsuch, with headquarters at Philadelphia. He is an old-timer, having started his telegraph career in April, 1872, with the Franklin Telegraph Company, stringing two wires between New York and Philadelphia, and doing general repairs to the line between New York and Washington. Later he worked for the Atlantic and Pacific Telegraph Company, as well as for the Franklin Company.

JOHN R. GORSUCH,
Construction Foreman.

In the spring of 1878 Mr. Gorsuch went to the Continental Telegraph Company and when the latter company was absorbed by the Western Union Company, he became construction foreman for the Bankers and Merchants' Telegraph Company, which was then, in 1880, starting to build lines between New York and Philadelphia. During this work he had some odd and humorous experiences. Although on a peaceful mission he occasionally encountered some opposition on the part of farmers. He hired a team to drive through the country between the two cities in order to pick out a route for the new line, and naturally found it necessary to ask many questions of the natives in regard to the different roads, which made them suspicious of him. At noon one Sunday he arrived at a little town near Flemington, N. J., where he continued to seek information and was in turn questioned as to his business and what he was doing in that part of the country. His answers not proving satisfactory to the local

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people, he was followed for several miles as he left the town, and at last had to give a more satisfactory explanation of his movements in order to prevent his going to jail as a horse thief.

Mr. Gorsuch was born on a farm near Bel Air, Md., September 30, 1848. He has been in the service of the United Lines and Postal Telegraph Cable Company since 1882 and was appointed to his present position of district foreman on April 1, 1891. He has made a splendid record for himself as a most capable foreman, and is as active today as he was twenty years ago.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. T. J. Jones for many years connected with this company at Pittsburgh, Pa., has been appointed district commercial manager to fill a new position.

Mr. S. M. Cullison, special agent of the eastern division, New York, is again on duty after a two months' sickness caused by blood poison.

Mr. Willis H. Jones, electrical expert identified with the operating department of this company at New York for many years, and a valued and frequent contributor of telegraphic articles to TELEGRAPH AND TELEPHONE AGE for the past fifteen years, has been advanced to a position in the office of Mr. W. E. Athearn, engineer of equipment, with the title of engineering assistant.

Mr. Jones's success is an illustration of the personal advantage that comes from careful study and keeping in close touch with developments in telegraphy. He has established a nation-wide reputation as a writer of technical telegraph articles in a popular style, and by the use of plain, every-day language has been able to explain ordinarily difficult technical points so that the merest novice could grasp them. Mr. Jones's book of diagrams and information on practical telegraphy is a text book of the telegraph and is one of the most popular and successful works on telegraphy ever produced. His advancement is a fitting reward for his conscientious industry and close observation of things around him.

Mr. E. A. Baird, chief clerk to Mr. W. A. Sawyer, district commercial superintendent, New York, has been appointed manager of the Pittsburgh, Pa., office, vice Nelson E. Church, resigned. On October 5, the employes of Mr. Sawyer's office and many friends at 195 Broadway, New York, presented Mr. Baird with a Morris chair as a token of their esteem. Superintendent Sawyer in a few felicitous remarks made the presentation. Mr. Baird left New York on October 8, to take charge of his new position. He is succeeded at New York by Mr. T. J. Farrell of Mr. Sawyer's office. Mr. Farrell was for many years, prior to coming to New York, manager of this company's office at Bridgeport, Conn., where he made an excellent record as an official. He is one of the younger members of the fraternity, having been born in Newark, N. J., May 20, 1884. In September, 1898, he began his telegraphic career as a messenger in his native city afterwards becoming an operator. He has by diligent effort risen through various positions of importance, and he assumes his new position with an experience that well qualifies him for the exacting duties he will be called upon to perform.

Mr. Charles M. McCann has been appointed chief clerk to Mr. M. T. Cook, division commercial superintendent, Chicago. Mr. McCann was formerly assistant chief clerk to Mr. Cook.

Mr. George Bell has been appointed wire chief at Boston, Mass.

Mr. C. H. Daniels, special agent for this company with headquarters at San Francisco, Cal., has been appointed commercial agent for the second district of the Pacific Division, with headquarters at Seattle, Wash.

Mr. John M. Fair, manager of the Western Union Telegraph office, Grand Rapids, Mich., resigned that position recently, being succeeded by Mr. Frank S. Gould. Mr. Fair may engage in other business in the spring, after taking a rest on his farm at South Woodslee, Ont. He has been in the telegraph service for over thirty years and has worked in the principal cities from New York to San Francisco. He was located in Detroit, Mich., several years where he held important positions with the Western Union Company. In 1898 he was appointed manager at Saginaw, Mich., where he remained for six years, being then transferred to the managership at Grand Rapids. During his incumbency at Grand Rapids he popularized the Western Union service and the business was largely increased.

Mr. Thomas H. Gore, manager for the Western Union Telegraph Company, at Knoxville, Tenn., was born in that city, November 6, 1883. He entered the telegraph service in Knoxville for the Southern Railway Company, in January, 1901, and remained with that company for four years. He then entered the service of the Western Union Telegraph Company and worked in the Memphis, Tenn., and New Orleans, La., offices. Afterwards he became manager at Hamlet, and Raleigh, N. C., and then train dispatcher on the Seaboard Air Line. Subsequently he was manager for the Western Union at Athens, Ga., and afterwards manager of the Postal Telegraph-Cable Company's office at Lexington, Ky. He was chief operator of the Knoxville Western Union office at the time of his appointment as manager.

New Western Union Incorporations. — The Western Union Telegraph Company of Illinois has been 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.

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The Telephone.

Purchase of Independent Telephone Companies.—Fifteen small independent telephone companies in New York State have been sold to the American Telephone and Telegraph Company.

Texas Telephone Lines Absorbed.—The Southwestern Telegraph and Telephone Company has purchased the lines of the Tri-State Telegraph and Telephone Company in the northeastern part of Texas.

Long Distance Telephone Service in Europe.—Telephone communication between Berlin, Germany, and Stockholm, Sweden, has been established by the use of the Egner-Holmstrom microphone.

High Telephone Station.—What is said to be the highest telephone station in the world is that on the summit of Mount Rosa in the Italian Alps. Its elevation is 14,960 feet above sea level. On account of its position, poles could not be used, therefore the wire was laid in the snow, which is very dry and a good non-conductor. The station is used for meteorological purposes.

Hamburg Exchange.—The new central telephone exchange in Hamburg, Germany, has a capacity of about 80,000 subscribers, and is one of the largest in the world. In the exchange 112,700 relays, controlling 70,000 incandescent lamps, are in use; 55,000 jack strips (1,100,000 single jacks) have been installed, 3,280,000 feet of flexible wire and a total length of 114,800,000 feet of leading wire were used, and 15,000,000 joints were made. The current for the microphones of the subscribers, for the signaling arrangements and the relays, is supplied from two accumulator batteries, each having a capacity of 7,800 ampere-hours, this being sufficient for 24 hours' working of the station. The total number of telephone operators (females) is 1,500.

Telephone Pioneers of America.

Active preparations are going forward for the first meeting of the Telephone Pioneers of America in Boston, Mass., November 2 and 3, and there is every indication that there will be a large attendance. Members in different parts of the country have signified their intention of being present. The headquarters of the convention will be at the Hotel Somerset.

Many of the members contemplate bringing their wives with them and a real enjoyable time is expected.

The first meeting will be called to order at 10 a. m., November 2, and the business of organization completed. In the afternoon addresses will be made by Dr. Alexander Graham Bell, Thomas D. Lockwood and other prominent telephonists.

Members desiring information regarding hotel accommodations are requested to address the committee of arrangements, which is composed of Messrs. Henry W. Pope, Charles R. Truex and Thomas B. Doolittle, 15 Dey Street, New York.

All those who wish to take advantage of the reduced rate from New York to Boston should notify the committee. A rate and a half round trip will be charged by train from New York, Pullman accommodations being $1.00 extra. The fare by boat will be $3.00 after November 1, plus $1.00 or $2.00 for state room.

The committee appointed on local arrangements at Boston consists of Messrs. W. J. Denver, chairman; G. H. Dresser, E. W. Longly, J. H. Barry, I. O. Wright and N. W. Lillie.

Mr. Francis A. Houston, general manager of the New England Telephone and Telegraph Company, says:

"On the evening of Thursday, November 2, the New England Company will entertain the visiting members and their wives at the theatre and on the morning of Friday, November 3, we will receive those who desire to visit our main exchange. On Friday afternoon an automobile excursion is to be arranged which shall include Concord, Lexington and suburbs of Boston. On Friday evening the American Telephone and Telegraph Company will entertain the Pioneers at a formal dinner at the Hotel Somerset. A separate banquet hall and entertainment for the ladies will be provided."

Mr. Henry McDonald of the American Telephone and Telegraph Company, Boston, is in charge of the arrangements affecting that company. The committee has authority to call upon any employe of the company to assist in the discharge of its duties. The organization committee is assured that every one will do his utmost to make the affair a great success.

It is proposed that the President of the Pioneers shall hold conversation with President Taft during the banquet, provided President Taft is within range of the telephone at that time, and arrangements are being made with this end in view.

Mr. Henry McDonald, chairman of Press and Hotel Committee, Boston, will reserve rooms, provided full particulars are given promptly.

Mr. R. H. Starrett, 15 Dey St., New York, chairman of Transportation Committee will provide special railroad rates if notified promptly.

The organization committee requests for exhibition any telephonic historical data that Pioneers may have, that is likely to be of interest and arrangements will be made to take care of such matters.

The 1912 Reunion of Old Timers.—The dates of next year's reunion of the Old Timer Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, which is to be held in Jacksonville, Fla., are October 22, 23 and 24.

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The Cable.

Tripoli Cable Interrupted.—The telegraph cable between Malta and Tripoli has been interrupted, cutting off telegraphic communication with Tripoli, the seat of war between Italy and Turkey. It is probable that the cable has been cut by one of the belligerents, as this is usually done in time of war.

Pacific Cable.—The report and accounts of the Pacific Cable Board, London, for the year ending March 31, shows a balance of £29,334 ($146,670) towards meeting the annuity of £77,544 ($387,720) in respect of interest and sinking fund on the capital of two millions sterling, an increase of £11,378 ($56,890) on the balance in 1909-10. The amount to be provided by the Imperial and Dominion Parliaments to make up the deficiency is, therefore, £48,210 ($241,050) for the past year. The Canadian land-line service was taken over by the Board in September last year, with satisfactory results, the average time of transmission between Great Britain and Australia being reduced by 15 to 18 minutes, and the accuracy of transmission being improved. A system of deferred messages at reduced rates is to be adopted within a few months. The number of international messages handled last year was 129,154, representing 1,849,613 words.

Radio-Telegraphy.

Wireless Between London and Continent.—A wireless station is being erected on the roof of the telegraph department of the British postoffice in London for the purpose of conducting experiments in wireless telegraphy with the Continent.

Uniting the British Possessions by Wireless.—It is reported from London that the experiments being conducted by Mr. William Marconi in New Foundland are part of a plan to unite various parts of the British empire by wireless with the Admiralty in London.

Wireless from Aeroplane.—At the recent flying meet at Brighton Beach, Coney Island, New York, wireless communication was maintained between George Beatty's aeroplane, while in the air, and the club house. John Dunn was the wireless operator who accompanied Mr. Beatty on his aerial trip.

Hertzian-Wave Fog Signals.—Three stations will be erected for the French government along the coast of France from which Hertzian-wave fog signals will be transmitted. Each station will emit a distinctive telephone note every thirty seconds, and repeat during ten seconds a letter of the Morse telegraph code. The telephone notes selected for the three stations correspond to given wave-lengths or frequencies.

Wireless Towers Not Necessary.—In his recent Newfoundland experiments in trans-Atlantic wireless transmission, Mr. William Marconi, it is stated, demonstrated that it is not necessary to have extensive towers erected in order that the work may be properly carried on. A wire run from the lighthouse at Fort Amherst to the top of the hill and attached to an ordinary pole has been found to do as good work as the most costly tower. In future therefore any station can be put up in a short time at a trifling expense and then taken down when the necessity for it has disappeared.

Wireless Telegraphy in the Kongo.—The Telefunken wireless station at Boma, now in operation, has an aerial of 53 meters (173 feet) in height. It is a one and one-half kilowatt station and generates its electricity by an eight horse power petroleum motor. The station at Banana is of the French Ferrier type, with an aerial 37 meters (121 feet) in height. It is at present a one and one-half kilowatt station, but will shortly be increased to five kilowatts. The same power to generate electricity is used as at Boma. The Telefunken engineers are now erecting a five-kilowatt station at St. Paul de Loanda.

Wireless Regulations in Australia.—The Postmaster General of Australia has issued regulations in which provision is made for the issue of general licenses at 5 shillings ($1.22) each for ships registered in Australia and for experimental licenses at £1 1s. ($5.11) each. The appliances on board ship are to be worked in such a way as not to interrupt or interfere with the naval or military signaling or the transmission of messages between other wireless telegraph stations. Except by permission of the Postmaster General the wireless aboard any ship (other than a ship of war) are not to be worked while the ship is in any harbor or any territory of the Commonwealth. Power is given to the Governor General to prohibit the use of wireless telegraphy on board foreign ships in territorial waters in case of emergency.

Obituary.

Frank S. Adams, aged 55 years, formerly manager of the Western Union Telegraph office at Henderson, Ky., died at Nashville, Tenn., September 23.

Peter J. Morrison, aged 65 years, one of New York's prominent telegraphers thirty years ago, died at his home in Brooklyn on October 2. Mr. Morrison was an operator in the main office of the Western Union Telegraph Company at 195 Broadway, New York, in the early eighties. He studied law while working at the key and was admitted to the bar, but never practised his new profession, except to attend to some legal matters for the Western Union Company. He was the head of the Brooklyn local counsel of the telegraphers' union at the time of the strike in 1883. After that memorable movement he never returned to the telegraph service. He identified himself with the brokerage business in New York in which he remained until the time of his death. The old guard was represented at the funeral by Messrs. John Costelloe, John J. Cochrane, Daniel C. Donohue, Frank Maier and T. J. Cusack.

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Annual Report of the Western Union Telegraph Company.

The annual meeting of the stockholders of the Western Union Telegraph Company was held in New York, October 11. The report of President Theo. N. Vail for the year ending June 30 shows the following results as to the financial operations:

INCOME ACCOUNT.

Gross Telegraph Earnings		$34,714,810.07
Miscellaneous Earnings		763,982.81
Total Earnings		$35,478,792.88
Deduct:		
Operating Expenses, including rent of Leased Lines, Reconstruction Repairs, Miscellaneous Interest, etc.	$29,153,631.63	
Taxes	900,000.00	
		30,053,631.63
Balance		$5,425,161.25
Add—Income from Loans and Investments, including Rentals from Real Estate		1,680,196.23
Net Profits		$7,105,357.48
Deduct:		
Interest on Bonds of the Western Union Telegraph Company	$1,733,389.52	
Dividends:		
Paid Oct. 15, 1910	$747,770.25	
Jan. 16, 1911	747,801.75	
Apr. 15, 1911	747,846.00	
July 15, 1911	747,886.50	2,991,304.50
		4,724,694.02
Balance transferred to Surplus Acct.		$2,380,663.46

TELEGRAPH LINES AND EQUIPMENT.

The increase in this amount for the year of $3,524,608.25 is made up of approximately $2,300,000 expended during the year for the completion of the Bay Roberts cable and approximately $1,200,000 spent in the construction of land lines.

The total cost of the Bay Roberts cable was $3,334,402.92, of which sum $1,037,093.39 was expended prior to June 30, 1910. Under the provisions of the proposed lease with the Anglo Company, it is provided that the cost of this cable shall be repaid to the Western Union Company.

There have been added to the company's plant during the year 1,403 miles of poles and 58,296 miles of wire, the latter consisting of 43,082 miles of copper wire and 15,214 miles of iron wire. On June 30, 1911, there were 24,926 Western Union offices.

GENERAL.

Notwithstanding the existing unsettled conditions of business, such as have heretofore caused a decrease in gross revenue, there has been an increase of $3,018,964—9.57% in total revenue. The increase in the message tolls was $3,153,122—12.58%. The only decrease was on the leased wires, which was nearly $400,000, or 15.31%. This was probably due to the rigid enforcement of the rules and regulations respecting the uses made of these wires by the lessees.

The large increase in gross is more than offset by the increase in the expenses of $3,167,853—13.14%, causing a decrease of $148,889 in the net revenue. Of this increase in expenses $2,369,434 was for salaries and wages, an increase in this item of 21.18% over last year.

While your company has had a great past, and cannot fail to have as great a future, present conditions, resulting from a long period of unsettled business and labor conditions and of economies and retrenchment, are, from a conservative standpoint, far from satisfactory.

Without going into detail, there still exists a necessity for the doing of many things which cannot be ignored. Salaries and wages to be readjusted, an effective and beneficial pension scheme to be inaugurated that good men may not only be retained, but encouraged and made to feel that the interest and prosperity of the company works for their interest and prosperity. Offices and apparatus and general surroundings to be improved, brightened up, that all work may be done under decent and sanitary conditions. Plant to be reconstructed, that promptness and efficiency may be required and obtained.

Considerable has been done in these directions, but much remains to be done, and when done there is no doubt but that the result will be increased economy and efficiency in the work and service, to the direct advantage of both your company and the public.

DIVIDENDS.

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.

NEW SERVICES.

The telegraph business of the past has been built upon, and all the traditions surrounding it are almost exclusively on, the idea of expedition or immediate service with a large surplus of facilities and operating staff, equal at any time to the maximum demand, and consequently idle much of the time. These surplus facilities, together with the cost of the insurance against damages for delays, avoidable or unavoidable, required for expedited business, necessitate higher charges for this class of service than if the business were handled so as to keep both plant and staff occupied to a fair maximum capacity. Unexpedited business would result in some delays to a part of the business, but the operating cost and plant charges would be so much reduced that a very appreciable reduction in the rates could be made.

There is, however, a great quantity of important business that demands expedition and is perfectly able and willing to pay for such expedition. To this class of business a retarded service with lower rates

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presents no attraction. Any increase in the use of or introduction of new uses for the idle and unused plant will reduce the cost per unit of service, or enable some other service to be given at a cost within the value of such service to the public. It was the belief that there was a large business which lay in value and importance, so far as transmission was concerned, between the expedited telegram and the ordinary mail that caused the introduction of the Day Letter and the Night Letter. When these new services become assimilated by the working organization, and the changes and innovations in plant and operating force now going on are in full working order, it is believed that some new and popular services, additional to those now in effect, can be given.

The "Night Letter" was intended to be an improvement and advance upon the "Night Telegram." In starting it the company took little risk beyond possible small increase of operating expenses. With the "Day Letter" the case was different. The revenue from excess words in regular telegrams over and above the amount charged for the "Day Letter" is several millions of dollars. All these millions of revenue would be lost if the "Day Letter" was used in place of long messages at regular tolls, whenever the charge for such messages exceeded the charge for Day Letters. Experience has shown the revenue from the Day Letter to be a substantial one, while the revenue from other forms of telegraphic service is not materially affected thereby. That the Day Letter has created its own place in the business of the company, and that there was and is a place for the Day Letter in the transaction of the country's business is shown by the results.

TELEPHONE AND TELEGRAPH RELATIONS.

Progress has been made in the direction of joint occupancy and joint use of facilities, largely, however, in the working out of arrangements and details of working. Progress in this direction is apparently slow because of the many details to be arranged and solved, all of which—though not insurmountable—are complex and much involved. The apparent progress of the future will be greater. All reconstruction, as well as construction, is being done on lines which will make your plant available for long distance telephone business and short distance telegraph business by telephone in connection with the Bell system.

PENSIONS.

The Committee on Pensions has been engaged in the collection of data necessary to enable the actuaries to give figures on benefits and expenses. This work has been somewhat delayed by the absence in Europe of vice-president Clark, the chairman of the Committee. The work will be necessarily slow, as it is desired that any pension scheme which may be established will, in case of disability, give material aid and benefit to those who have been for a few years only in the service of the company, as well as to those of long service. Whatever scheme is put in operation will take into consideration past service, and will therefore involve a large expense from the very start. While the general scheme is being worked out, all necessitous cases are being provided for.

TRANSATLANTIC CABLES.

There is very little additional to what has already been laid before you. The proposed arrangement, if ratified, will put the Western Union in a position where it can handle the transatlantic cable business in a manner which will be in accordance with its importance and to the satisfaction of the public, something that has been impossible neretofore.

The charges assumed are about the equivalent of the dividends which the two companies have been making from the business, and everything indicates that under any probable future conditions the transatlantic cable business will be a source of profit instead of a loss to the Western Union, as heretofore.

Under the arrangement the Western Union is reimbursed for the cost of the new cable laid last year, amounting to $3,334,402.92, and is relieved from the large additional investment, amounting to twelve to fifteen millions, involving the duplication of existing facilities now only partially utilized, which would have been necessary had these arrangements not been made.

The Anglo-American and the Direct United States Cable Companies have at their preliminary meeting unanimously ratified the proposed arrangement, and this action will without doubt be confirmed in all statutory proceedings to follow.

The lease of the Direct and Anglo-American cables was ratified unanimously, and the old board of directors was re-elected.

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.

Telephone and Telegraph Society of New England.

The Boston Plant Chapter of the Telephone and Telegraph Society of New England held its second regular meeting in Boston October 10. The new method of accounting, so far as it affects the workman, was thoroughly explained and discussed by Mr. F. X. Colleton, special agent for the superintendent of plant, and Mr. H. C. McKay, plant accountant, Boston and southern Massachusetts divisions.

A course of short talks on the fundamental principles of electricity in their direct application to telephone apparatus was started at this meeting, also a Question Box. Telegraph employes are welcome at these meetings.

Mr. Gordon S. Wallace, 125 Milk Street, Boston, Mass., is secretary of the Chapter.

Mr. L. E. Rudd, manager of the Western Union Telegraph Company at Memphis, Tenn., in renewing his subscription says: "You did exactly right in renewing my subscription to TELEGRAPH AND TELEPHONE AGE. I do not feel that I can keep house without your paper."

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Sending the First Cable Messages to Europe.*

BY J. B. VAN EVERY, VICE-PRESIDENT, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

On July 29, 1866, the first successful Atlantic cable was opened for public traffic and the office of the Western Union Telegraph Company at No. 145 Broadway, New York, became the centre of popular interest. The scene, with its curious costumes and conditions, is preserved in the sketch made by an artist of *Harper's Weekly*, a copy of which is now preserved at Western Union headquarters and reproduced herewith.

SENDING CABLE MESSAGES FROM 145 BROADWAY.

Almost simultaneously with the opening of the cable the Western Union Telegraph Company had taken possession of the office building at No. 145 Broadway, through the absorption of the last of its great rivals of that day. Previous to that time, its headquarters had been at Rochester, N. Y., and its lines were principally in the Middle West. But in 1866 negotiations were completed for the Western Union to buy its rival, the American Telegraph Company, which controlled the principal lines along the eastern seaboard.

On the night of July 31, 1866, the officers of the Western Union left Rochester for New York City to take possession of the American company's offices and property. I remember that we young clerks in the party thought it a historic trip, and so it was in telegraphic history.

Our president, Mr. J. H. Wade, was not on the train. I think he already was in New York, where he had been conducting the negotiations for the consolidation. Vice-president R. R. McAlpin headed our party, and accompanying him was Mr. O. H. Palmer, the secretary and treasurer. There were a number of minor officials and clerks; I was among the latter, and I remember spending the evening on the cars with Mr. R. Hart Rochester, who was then a clerk like myself, but afterwards became treasurer of the company and filled that position for many years.

We arrived in New York on the morning of August 1, and going down to No. 145 Broadway, which had been the headquarters of the American Company, we took possession of the offices. I re-

*From *Journal of the Telegraph.*

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member that Dr. Norvin Green, who afterwards became president of the Western Union, was there when we arrived. He had just made an announcement to all the American employes that they were discharged because new proprietors were coming into possession, and there was much gloom around the place. But most of the men were immediately re-employed by the Western Union management. Dr. Green was then connected with the American Company, which had absorbed his Southwestern lines earlier in 1866.

The laying of the Atlantic cable had been completed on July 27, with the arrival of the *Great Eastern* at Heart's Content, Newfoundland, and various private messages were being sent over the wires. A few days after the Western Union had become the all-powerful land telegraph company, and moved to New York, the cable began commercial business.

The rates were high. The minimum charge was $100 for a message of twenty words or less, five letters counted as a word, or as the public figured it out a dollar a letter. The cable was owned by the Anglo-American Cable Company, whose headquarters were in London. It maintained no offices in the United States, the Western Union receiving and delivering all the messages therein as well as in a portion of Canada.

Meeting of International Electrotechnical Commission at Turin.

At the meeting of the International Electrotechnical Commission which was held at Turin, Italy, September 7-16, the following letters were definitely adopted for the international representation of the quantities entering into the algebraical expression of Ohm's law:

Current I
Electromotive force .....E
Resistance .....R

Mr. Gano Dunn, president of the American Institute of Electrical Engineers, and a former telegrapher, invited the commission to hold an official meeting at San Francisco in 1915, on the occasion of the Panama Pacific Exposition, to be held in celebration of the opening of the Panama Canal.

The following resolution was adopted: "The International Electrotechnical Commission expresses its willingness to hold an official meeting at San Francisco in 1915, and instructs the central office, on the request of the American Institute of Electrical Engineers, to co-operate with it in the organization of an International Electrical Congress at San Francisco at the same time."

Nineteen countries were represented, the delegates from the United States being Messrs. Gano Dunn and C. O. Mailloux; Professor Elihu Thomson and Drs. A. E. Kennelly and C. H. Sharp. Both Mr. Dunn and Dr. Kennelly are former telegraphers.

Any book on electrical subjects can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York.

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 aid 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 unfold the answers. This method of acquiring technical knowledge is a fascinating one.]

CHAPTER IX (*Continued*).

In balancing a quadruplex, what is the first request to make of the distant (B) station?

Having grounded the line at B, what is the next step in the work?

What is the ground coil, and what is its purpose?

Should the resistance in the ground coil be altered?

If altered, what would be the effect upon the balance?

With the line grounded at *A* and *B*, what is the next step in balancing?

After cutting in the home battery what is done next?

In balancing what is the effect of line induction upon the No. 1 relay?

When inductive effects are manifested what should be done?

If the wire is much out of balance what will be the effect upon the polar relay armature?

After having obtained a balance with the home battery to line, what is to be done next?

When *B* cuts in his battery what is the usual effect upon the inductive disturbance?

Under what conditions may condensers be dispensed with in balancing a line?

Study the analogy between a water pipe and a wire statically charged.

What is the effect of induction upon a wire, considered as a reservoir of electricity?

Is there a time when the polechanger cuts off the supply of electricity to the line?

The line being charged with electricity, what becomes of the charge when the source of current is cut off temporarily by the polechanger?

What is the effect of the charge (static) upon the relay when it returns to ground, or earth?

How does the condenser counteract the effect of the line discharge upon the relay?

Do the coils in the rheostat have as great a capacity for retaining an electric charge as does the line itself?

Why is the condenser placed in the artificial line?

How is it charged and how is it discharged?

When it discharges, how does the charge pass through the home relay coils, and why?

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The New Western Union Telephone Building in New York.

Some additional facts are at hand regarding the construction and equipment of the new building being erected in New York for the joint use of the Western Union Telegraph Company, the American Telephone and Telegraph Company, and the New York Telephone Company.

The plans contemplate accommodations for 2,600 telegraph employes at one time, should the demands for operating forces require that number.

It is probable that the traffic and plant departments of the Western Union will move from the present quarters at No. 195 Broadway to the new building about January 1, 1913, but the executive offices will remain in the old building.

The assignment of telegraph space is to be as follows: A receiving department is to be located at the easterly end of the main entrance in Walker Street and will be arranged so that the general entrance to the building will also serve the patrons of the telegraph company who desire to file telegrams there. This booth will be connected with the operating department by pneumatic tubes.

About one-half of the space on the eleventh floor is to be assigned to the female employes for rest rooms, lavatories and locker rooms, and the remaining space will be temporarily occupied by the district offices until such time as it is required for enlarging the employes' quarters.

Two-thirds of the twelfth floor will be given up to the male employes for rest rooms and the remainder of the space to district offices until such time as the growth of the operating force demands the entire twelfth floor for quarters.

The thirteenth floor will be used by the plant department for the accommodation of main cross-connecting racks, switchboards, repeater tables, multiplex apparatus and a motor-generator plant. This equipment will consist of approximately forty-five sections of main line, city line and multiplex loop boards at the time of initial occupancy and of about seventy-five sections by the year 1930. The cross-connecting frames will accommodate approximately 20,000 and 36,000 wires for the initial and 1930 periods respectively.

The transmission and reception of telegrams will be entirely excluded from this floor and all communication between the switchboards, multiplex sets, repeaters, etc., and the operating rooms will be effected by means of a very elaborate signaling arrangement, which will permit instant communication between any and every operator's position and the switchboard and repeater attendants.

All Western Union underground cables will occupy a large cable vault in the basement, jointly with the cables of the telephone company. They will be brought up in three-inch vertical tile ducts rising from the cable vault to the thirteenth floor. There are to be eighty-five of these ducts exclusively for Western Union cables.

There is to be a complete arrangement of switchboards and telegraphic equipment to permit a liberal interchange of facilities with the plant of the American Telephone and Telegraph Company, which is to occupy other floors in the same building.

The operating department will occupy the fourteenth and fifteenth floors and ultimately the sixteenth and seventeenth floors, it being the plan to move the other departments to other floors or to space in adjacent buildings as demands may require.

The sixteenth and seventeenth floors will be constructed so as to permit conversion into operating rooms without recourse to structural changes, when desired.

It has been already decided that there must be no human element of delay between the time a telegram is received from a wire and the time it reaches the routing department. To accomplish this means automatic conveyance of telegrams from every operator's position direct to the routing table.

Special tables, known as concentration tables, are being devised that will permit grouping a multiple of circuits on one table or a group of tables equipped with signal and switching devices to insure the maximum output with the minimum delay.

The operating department is to have an extensive pneumatic tube system connecting with many of the important branch offices. The power plant for the pneumatic tubes is to be located in the basement. Efforts are being directed to make all equipment in the plant and operating departments of non-inflammable materials as far as practicable.

The sixteenth floor will be occupied by the bookkeeping department until such time as it is needed as an operating room. There will be desks provided for 250 clerks, together with the filing cases for this department.

On the seventeenth floor is to be located an employes' dining room, which is to accommodate 325 people initially and 475 ultimately. In addition to the dining room, there will be located on the seventeenth floor a telephone room for the reception and delivery of telegrams by telephone. This room is to have an ultimate capacity of one hundred telephone operators, it being the plan to develop this branch of the service to its maximum capabilities.

Further details regarding the new building were given in our issues for February 16 and September 16.

Evening Course in Telegraphy and Telephony at Columbia University.

Recognizing the need of a course of technical instruction in the allied arts of telegraphy and telephony to be conducted in the evening and open to men employed during the day time, a regular course will be inaugurated at Columbia University, New York, commencing early in October.

A Modern Messenger Boy.—A telegraph messenger in Tarrytown, N. Y., Max Schwartz by name, has discarded the use of a bicycle in the delivery of messages because he states it is too slow. It takes too long to push the bicycle up the hills, so he prefers to run.

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Improved Pole Changer.

BY STEPHEN D. FIELD, OF STOCKBRIDGE, MASS.

The arrangement of apparatus shown in the accompanying illustration is the outgrowth and may be considered as an improvement on the continuity-preserving pole changer illustrated in TELEGRAPH AND TELEPHONE AGE August 1. The advantages which it possesses over existing methods is that all passing signals are at all times audibly recorded exactly as they go to line thus ensuring accurate and constant supervision.

The signals are primarily transmitted by the relay contacts subsequently reinforced and emphasized by those on the sounder lever. The contacts are absolutely continuity-preserving and sparkless thus ensuring an easy and continuaus balance. The re-

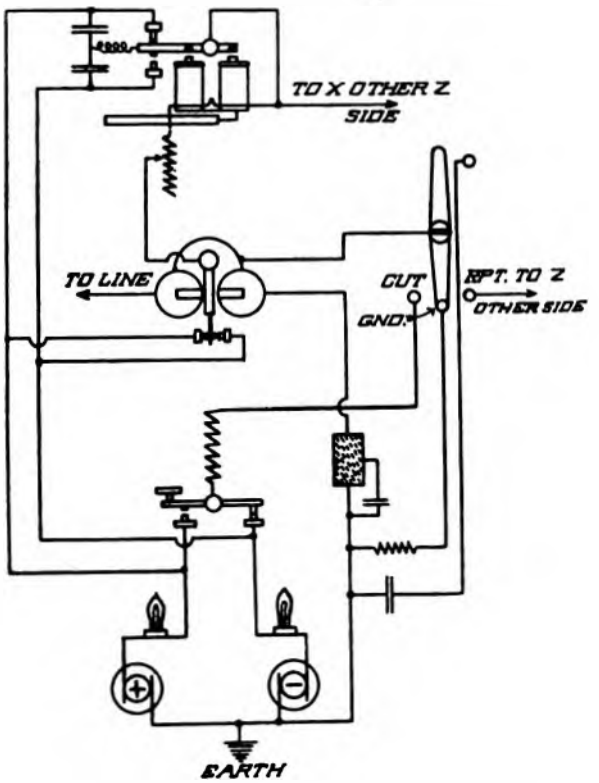

DIAGRAM OF IMPROVED POLECHANGER.

versal is graduated so as to put current to line with a speed which the line can accommodate, the currents being transmitted in wave form rather than in the abrupt manner incident to circuit-breaking pole changers.

The sounders are entirely insensible to incoming line currents, such currents balancing on the twin condensers attached to the sounder lever. If they add to the charge in one an equal amount is subtracted from the other. An impedance about equal to that of a four ohm sounder is placed between the sounder lever and twin condenser. This prevents welding of contacts in case of accidental manual manipulation of the sounder lever when the battery is connected. Under ordinary operation no sparking or welding is noticeable.

The polar sounder employed has four coils connected to a permanent magnet, after the Hughes type. These coils are connected in series opposition, and have a combined resistance of about one hundred ohms.

In operation, when the relay moves from one contact to the other it diminishes the line battery in any desired amount determined by the choking action of the sounder magnet and its allied resistance. At this instant one of the condensers is discharged through the sounder magnets thus actuating the sounder lever which, on leaving its contact (not on completion of stroke) instantly accomplishes a modulated reversal.

Upon completion of the excursion of the sounder lever all extra connections are removed from the circuit and full unhampered current passes to the line in the reverse direction to that existng at first.

So perfectly can these signals be modulated that fair telephonic transmission can be had on the same line without any further compositing device other than the relays usually in circuit.

The inductive effect on parallel circuits is at once reduced to a minimum.

An impedance in the key circuit acts in conjunction with the condenser as shown, thus serving to modulate the signals when the apparatus is "cut" for testing or balancing.

When the apparatus is cut for local distribution, an extra contact is provided on the polar sounder lever, and a pole changer substituted for the key.

Though illustrated as a polar duplex it is obvious that the apparatus is adapted to use as a pole changer on quadruplex circuits with equal advantage.

Telephone Texts in Scriptures.

The *Bell Telephone News* publishes a list of texts contained in the Bible which could be construed as pointing to the invention and operation of the telephone. We reproduce a few of them herewith:

Their line is gone out to all of the earth and their words to the end of the world. Ps., xix., 4.

We have no might against this great company. II Chron., xx., 12.

Now, shall this company lick up all that are around about us? Num., xxii., 4.

The great city was divided into three parts. Rev., xvi., 19.

Charge the people! Exodus, xix., 21.

Is there any number? Job, xxiv., 3.

The number is 666. Rev., xiii., 18.

When I call answer me speedily. Ps., cii., 2.

Where is the receiver? . Isa., xxxiv., 18.

They could not take hold of his words. Luke, xx., 26.

I said in my haste "I am cut off." Ps. xxxi., 22.

If he cut off, and shut up, who can hinder him? Job., xi., 10.

I will cut him off. Lev., xxvii., 10.

Rebuke the company. Ps., xviii., 30.

What word is this! Luke, iv., 36.

Thou hast nothing to pay. Prov., xxii., 27.

Wherefore kick ye? I Sam. ii., 29.

Twenty and three! Judges, x., 2.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - - - *Publisher*
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
R. J. WEEKS, Manager Advertising Department.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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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.

October 16, 1911.

A Glimpse of a High Power Wireless Station.

Very few persons outside of the elect have any idea how a transatlantic wireless telegraph station is worked. These stations are necessarily of high power and their equipment usually embraces apparatus and refinements that it is desirable shall not be seen by vulgar eyes

A ray of light has been given to the world revealing the inner operatiohs at the great wireless station at South Wellfleet, Mass., from which news service in transmitted each night to ships at sea. The story is exceedingly interesting and we reproduce it on other pages in this issue. It reveals many facts that are not generally known regarding this class of service, and shows in a general way what has been done to insure success of operation and the attainment of results.

It is interesting to note that the news dispatches sent each night to the ships at sea are transmitted automatically from perforated tape, and that the same dispatches are sent out into space several times in order to make it certain that the receiving operators on the ships shall not miss any portion of them.

The operation of a high power, long distance wireless plant is vastly different from working a Morse land wire. It may be likened to a circuit with transmitting apparatus at one end and receiving instruments at the other, and nothing more—no key at the receiving end with which to "break." If the wireless receiving operator on any of the ships fails to get all that is coming to him at one transmission what he does not get would be irretrievably lost were it not for the retransmissions. That is why the news dispatches sent out from Cape Cod are transmitted several times. By this means the receiving operators are reasonably sure of getting every signal, although some letters or words may have gone astray during one or more of the transmissions. By putting the parts together, however, the complete despatch is the result.

Apart from the interesting description of the routine at this station the impressive fact is forced upon us that the managers of this system are doing everything that good judgment and science can suggest to secure useful and practical results.

On account of the great noise of the sparks this station has been dubbed "Marconi's thunder factory." It may not be possible to steal his thunder very well, but it is possible to steal his lightning while it is on the wing.

The Telephone as a Life Saver.

The recent disaster at Austin, Pa., resulting from the bursting of a dam, furnished the occasion for another demonstration of the great value of the telephone in emergencies. In this instance it was the means of saving probably hundreds of lives. In itself of course it could do nothing, but backed by cool human brains it warned scores of people of the impending danger, many of whom no doubt would have lost their lives had they not been thus forewarned. The telephone operators who stuck to their posts in the face of the danger and spread the danger alarm to as many people as they could reach by wire, will go on record as heroines as they deserve. Their brave acts were most praiseworthy and are entitled to the highest public recognition. The telephone company, we understand, has rewarded them in a substantial manner for their bravery. The mere expression of admiration for a brave act is a cheap way of showing appreciation. but a substantial increase of salary at such a time is more expressive than all the compliments that can be uttered.

Order to Re-establish Branch Office in Baltimore.

The Maryland Public Service Commission has ordered the Western Union Telegraph Company to re-establish its branch office in the Belvidere Hotel at Baltimore

The case has been in dispute for several months. The Western Union and Postal Companies closed their offices in the hotel because they were requested to move the offices from the lobby to the basement. The hotel company appealed to the Public Service Commission to compel the telegraph companies to return, but lost its case. In the case just closed against the Western Union the Commission decided that it has the power to require the establishment of offices in a given locality and in a certain building.

The company contended that the nearby office on Richmond Street was sufficient for the needs of the hotel patrons but the Commission thought otherwise after summing up a report of the business done in the two offices.

Mr. D. Harrison, manager of the Western Union Telegraph Company. Atchison, Kan. writes: "Here's $2.00. Keep sending your paper until I 'break' or get broke."

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Joint Telephone and Telegraph Sign.

The American Telephone and Telegraph Company and the Western Union Telegraph Company have adopted a joint sign for their offices and it is now being manufactured for general use.

The design of the sign is shown in the accompanying illustration. The familiar telephone sign is coupled with that of the new Western Union em-

JOINT TELEPHONE AND TELEGRAPH SIGN.

blem, by the words "Universal Service," which are very appropriate and significant.

The sign is of the enamel type, the lettering and design being in blue, against a white background.

Magnetic Club Dinner.

The autumn dinner of the Magnetic Club will be held at the Hotel St. Denis, New York, Wednesday evening, November 15. The officers and members of the executive committees of the Old Time Telegraphers' and Historical Association, and the Society of the United States Military Telegraph Corps, have been invited to attend the dinner as the guests of the club.

The out-of-town delegates to the annual meeting of the Telegraphers' Mutual Benefit Association, which is to be held on the afternoon of the same day, have also been invited to attend the Magnetic Club dinner.

The greater part of the evening will be devoted, as usual, to an entertainment, although some of the guests will be invited to make brief addresses.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange October 9:

Western Union Tel. Co.	79⅛
Mackay Companies	85
" " pfd.	73½
Amer. Telep. and Teleg. Co.	134

DIVIDENDS.

A dividend of two dollars per share will be paid on October 16 to stockholders of the American Telephone and Telegraph Company.

The Western Union Telegraph Company will pay its stockholders 75 cents per share on the same day.

The Mackay Companies paid its shareholders $1.25 per share on common stock and $1.00 on its preferred stock on October 1.

Members of the telegraph fraternity are large holders in the stocks of the telegraph and telephone companies, over $2,000,000 in the Mackay Companies being held by them, and fully $4,000,000 of American Telephone and Telegraph and Western Union stock is registered in the names of persons identified with these interests.

Our Subscription Contest.

Interest in our subscription contest is rapidly growing and our agents are exerting themselves to get new subscribers to TELEGRAPH AND TELEPHONE AGE and incidentally win one of the prizes offered for their work.

The conditions of the contest were given on page 594 of our issue for September 1. There are five prizes, as follows: First, $50; second, $25; third, $15, and fourth and fifth, $5 each. The contest is limited to new subscriptions and renewals only. The total amount received from each agent on this account will decide the contest. In the event of a tie on any one prize, the prize will be divided.

In offices where there is no regular agent for this journal an agency may be established by securing an appointment, and any reliable person can thus enter the contest. An agent in a small office has just as good a chance to win as has the one in a large office, and it is desired that many more new agencies be established. There are many telegraphers throughout the country who are not subscribers, but who ought to be for their own good.

The contest will close December 20, therefore there is ample time for hustlers to enter the lists and make a record.

TELEGRAPH AND TELEPHONE AGE is a better paper now than it ever has been, and we expect to improve it with each issue. It is not stagnant; it is progressive, and, all telegraphers should be progressive by reading it carefully. It has good claims for greatly enlarging its subscription list and agents should point out the excellent features of the paper to prospective subscribers.

London Electrical Exhibition.—An electrical exhibition was opened in London on September 23 and the postoffice exhibit (telegraph and telephone) was an extensive one. The telephone exhibit consisted of a working exchange, the equipment being of the latest common battery type. Two demonstration telephones were provided in order to show visitors the various steps taken in dealing with a telephone call. The telegraph exhibit comprised sets of modern apparatus in working order. Chief among these was the Wheatstone A B C apparatus, which is used chiefly at small country postoffices where the assistants are unable to use the ordinary Morse instruments. The Hughes type-printing apparatus was also shown. There was also an extensive exhibit of early telegraph and cable apparatus, etc.

American Engineers and Engineering. — Mr. Carl S. Dow is the author of an article in the *Chautauquan*, entitled "American Engineering." A large part of the article is devoted to a description of the work of Mr. Thomas A. Edison and of Prof. Alexander Graham Bell, and portraits of these two gentlemen are shown.

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Course of Instruction in the Elements of Technical Telegraphy.

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INTRODUCTION.

We begin in this issue the publication of a course of instruction in technical telegraphy, which was prepared as a correspondence school course by Mr. J. H. Penman, of Rockport, Mass., an electrical engineer of ability and high standing. Credit is also due to other engineers and experts who furnished, through the columns of TELEGRAPH AND TELEPHONE AGE, much of the material upon which the lessons are based.

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 will be divided into chapters, following one another in logical order. It necessarily starts with a brief review of elementary mathematics in order to freshen the memory on this important branch of knowledge, for telegraph engineering, in common with all other branches of engineering, is based on mathematics.

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.

In the first lesson in arithmetic we have omitted everything up to fractions, and begin the work from that point.

LESSON I.

FRACTIONS.

The term above the horizontal line of a fraction is called the *Numerator;* the lower term, the *Denominator.* The *value* of a fraction is the numerator divided by the denominator, as $\frac{4}{2} = 2$, $\frac{6}{2} = 3$.

The line between the numerator and denominator, or the sign $\div$ means *divided by.* Thus, $\frac{5}{6}$ is equivalent to $5 \div 6$.

The value of a fraction whose numerator and denominator are equal is 1. Thus, $\frac{4}{4} = 1$.

A *proper* fraction is one in which the numerator is less than the denominator, as

An *improper* fraction is one in which the numerator is not less than the denominator, as $\frac{6}{5}$, $\frac{10}{7}$.

A mixed number is a whole number and a fraction united. $4\frac{2}{3}$ is a mixed number, and is equivalent to $4 + \frac{2}{3}$.

Fractions whose denominators may be any number, whole or fractional, that is, common or ordinary fractions, are called *vulgar,* whereas fractions whose denominators are 10, 100, 1,000, and so on, are called *decimal* fractions.

A fraction is reduced to lower terms by dividing both terms by the same number. Thus $\frac{4}{12}$ is reduced to $\frac{1}{3}$ by dividing both terms by 4.

To reduce a mixed number to an improper fraction:

RULE (1). *Multiply the whole number by the denominator of the fraction, add the numerator to the product, and place the denominator under the result.*

Example: Reduce $37\frac{3}{4}$ to an improper fraction.

Solution: $37 \times 4 = 148$; $148 + 3 = 151$;

$37\frac{3}{4} = \frac{151}{4}$. Ans.

To reduce an improper fraction to a whole or mixed number:

RULE (2). *Divide the numerator by the denominator, the quotient will be a whole number if the division is even; if there be a remainder it will be the numerator of the fractional part of which the denominator is the same as the denominator of the improper fraction.*

Example: Reduce to a mixed number $\frac{701}{6}$.

Solution: $701 \div 6 = 116$ and 5 remaining. The denominator of the improper fraction being 6, the remainder becomes $\frac{5}{6}$, and the mixed number is thus $116\frac{5}{6}$. Ans.

A *common denominator* of two or more fractions is a number which will contain all of the denominators of the fractions without a remainder.

The *least common denominator* is the least number that will contain all the denominators of the fractions without a remainder.

To find the least common denominator:

RULE (3). *Divide each of the denominators by some whole number which will divide, if possible, two or more of them without a remainder, bringing down these denominators, which will not contain the divisor without a remainder, to the row below; continue doing this until the last row contains only 1's, when the product of all the divisors is the least common denominator.*

Example 1: Find the least common denominator of $\frac{5}{10}$, $\frac{3}{16}$, $\frac{3}{8}$.

Solution:

2)	10	16	3
5)	5	8	3
8)	1	8	3
3)	1	1	3
	1	1	1

$2 \times 5 \times 8 \times 3 = 240$. Ans.

Example 2: Find the least common denominator of $\frac{5}{9}$, $\frac{8}{12}$, $\frac{3}{18}$.

Solution:

3)	9	12	18
3)	3	4	6
2)	1	4	2
2)	1	2	1
	1	1	1

$3 \times 3 \times 2 \times 2 = 36$. Ans.

To reduce two or more fractions to fractions having a common denominator:

RULE (4). *Divide the least common denominator by the denominators of the given fractions and multiply both terms by the quotient.*

Example: Reduce to fractions having a common denominator:

$\frac{4}{10}$, $\frac{6}{10}$, $\frac{9}{10}$.

Finding the least common denominator:

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5) 10 40 20
2) 2 8 4
2) 1 4 2
2) 1 2 1
1 1 1

$5 \times 2 \times 2 \times 2 = 40$, the common denominator.

Dividing the least common denominator by the denominator of the first fraction, $\frac{4}{10}$, gives

$40 \div 10 = 4$.

Multiplying both terms of $\frac{4}{10}$ by 4, gives $\frac{16}{40}$

Similarly, $\frac{6}{10}$ gives $\frac{24}{40}$, and $\frac{9}{20}$ gives $\frac{18}{40}$

$\frac{16}{40}$, $\frac{24}{40}$, $\frac{18}{40}$. Ans.

ADDITION OF FRACTIONS.

To add fractions:

RULE (5). *Reduce the given fractions to fractions having the least common denominator, and write the sum of the numerators over the common denominator. When there are mixed numbers and whole numbers add the fractions first, and, if their sum is an improper fraction, reduce it to a mixed number and add the whole numbers with the other whole numbers.*

Example 1: Find the sum of $\frac{3}{7}$, $\frac{14}{49}$, $\frac{2}{7}$.

The least common denominator is 49.

Reducing the fractions to this common denominator: $\frac{21}{49}$, $\frac{14}{49}$, $\frac{14}{49}$. Adding the numerators:

$$21 + 14 + 14 = 49$$

Placing 49 over the common denominator $\frac{49}{49}$, or 1. Ans.

Example 2: Find the sum of $2\frac{4}{11}$, $1\frac{7}{22}$, $4\frac{1}{2}$.

Add the fractions first; their least common denominator is 22. Reducing the fractions to this common denominator: $\frac{8}{22}$, $\frac{7}{22}$, $\frac{11}{22}$. Adding the numerator: $\frac{26}{22} = 1\frac{4}{22}$. Adding the whole numbers:

$$2 + 1 + 4 + 1 = 8\frac{4}{22}$$ Ans.

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.

Maver's American Telegraphy.

The new and enlarged edition of Maver's "American Telegraphy and Encyclopedia of the Telegraph," known as the 1909 edition, 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 Long Distance Printer, as operated on the lines of the Western Union Telegraph Company, and the Murray Printer, as now used in Europe. 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 to 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.

Mr. H. J. Jeffs, district traffic superintendent, Western Union Telegraph Company, San Francisco, Cal., in renewing his subscription for another year, writes: "I thank you for renewing my subscription, and wish to add that you deserve credit for the quantity and quality of reading matter, which the TELEGRAPH AND TELEPHONE AGE is now serving its subscribers. It is becoming more interesting each year."

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Recent Developments in Radio-Telegraphy.*

BY PROF. G. W. O. HOWE.

During the last two or three years the number of radiotelegraphic installations has increased enormously both on land and sea. This increase has not been due so much to any new discovery or striking improvement as to several instances in which radiotelegraphy prevented what might otherwise have been terrible calamities at sea.

The total number of ships of the mercantile marine fitted with Marconi apparatus at the end of 1907—that is, after seven years of development—was 140; at the end of 1908 the number was 220; at the end of 1909 it was 330; while at the close of last year it had risen to 510. In addition to the mercantile marine, practically every ship in the British navy has been fitted with the Marconi apparatus.

The Telefunken Company of Berlin carried out 106 installations last year, bringing the total number of stations using its apparatus up to nearly 1,000. About 500 of these are warships, principally German and Russian, while 100 are portable military sets. Excluding German boats, only thirteen ships of the mercantile marine are fitted with Telefunken apparatus.

Marconi's earliest experiments were made in 1895-6; and now, after fifteen years, every passenger ship of any magnitude has its wireless installation as a matter of course. There is every indication that very soon practically every ship will be so equipped. Some of the trawlers of the North Sea fishing fleet have recently been fitted with Telefunken apparatus, with a range of 100 miles. These boats receive the weather reports sent out daily from the coast stations, which are thus able to warn the fleet of approaching storms.

The nature of the telegraphic service which may be required of a station is widely varied. A station may have to work with only one other station and never send to or receive from any other. This is practically the case with the transatlantic stations. A station may work with a limited number of stations of definite and well-known characteristics, as in the case of the mailboats running between England and the Continent. On the other hand, a station may have to correspond with all comers.

One can easily see that apparatus which might be eminently suitable in one case would be very unsuitable in the other. Stations in the first category can use uncommon wave-lengths, and thus free themselves, to a large extent, from interference from other stations, besides being able to use a large amount of power without causing interference.

If it were possible for every station and every ship to have a different wave-length, interfering stations might be tuned out to a certain extent, but for the sake of uniformity and convenience in working, the majority of stations have about the same wave-length, so that when one is tuned to receive the desired message, one is also tuned to the disturbing stations. The result is that one station tries to shout the other down, and the successful working of all the stations is greatly hindered.

Apart from all this, there are the atmospheric disturbances, which vary widely from time to time. When a station is receiving from another station at a distance of 1,000 miles, it will certainly "pick up" every lightning flash over a large part of the earth's surface. These atmospheric disturbances are often strong enough to make working impossible over any but very short distances, even when the weather conditions locally look ideal. Whether one can receive or not in spite of the atmospheric disturbances depends on the nature and loudness of the signals, so that one can become more and more independent of the atmospheric conditions by increasing the power employed, and by making the signals easily distinguishable from the sounds caused by the disturbances.

Recent developments in the sending apparatus have been largely directed towards obtaining freedom from interference. This has been sought in two ways: firstly, by sending out well-sustained trains of waves of one definite frequency, thus permitting sharper tuning; secondly, by giving the signals a high musical pitch, easily distinguished from the crackling noises caused by atmospheric disturbances, and also from other stations having notes of a different pitch. The spark gap must be so designed that these characteristics are retained when very large powers are employed. A gap may give excellent results when the power is small, but fail entirely when the power is increased. Absolute reliability and constancy are of far greater importance than efficiency, although any improvement in the latter is naturally to be welcomed, not so much for the saving of power as for the reduction in size and cost of the apparatus.

Quenching of the spark was discovered in 1906 by Prof. Max Wien, and was afterwards taken up by the Telefunken Company, which has evolved a form of spark gap, in which the quenching is very effective. The gap acts as a very quick acting minimum current cut-out, and opens the primary oscillating circuit at the first opportunity—viz., when all the energy has been transferred to the aerial. The time during which the two circuits are coupled is very short, the loss in the spark gap is reduced, and the major portion of the energy oscillates freely in the aerial, and is radiated as a damped train of waves at its natural frequency. In this way it is claimed that seventy-five per cent of the output of the alternator is transferred to the aerial.

Turning now to the receiving apparatus, we find that the filings coherer has practically disappeared. The reception of the signals is now always aural. The detectors now employed in conjunction with the telephone receiver are not much more sensitive than the filings coherer operating a Morse inker, but they enable the operator to discriminate between the signals being sent to him and the various disturbances picked up by the aerial, which, as we have already seen, is a matter of ever increasing importance.

*Abstract of paper read before the British Association for the Advancement of Science, at Portsmouth, England, September 4.

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The magnetic detector used by the Marconi Company is ideal in its simplicity and reliability, but is not so sensitive as the electrolytic or the mineral-contact detector. The Telefunken Company has recently given up the electrolytic detector in favor of a detector of the latter type. Another type of detector used to a certain extent is the Fleming valve, which combines extreme sensitiveness with comparative simplicity and reliability.

To produce a musical note of high pitch it is necessary to make the sparks follow one another rapidly and with great regularity. When sending at a speed of twenty words per minute, the duration of a dot will be about one-twentieth of a second, so that with a spark frequency of thirty per second the dot will consist of one or, at the most, two sparks, whereas with a spark frequency of 1,000 per second the dot will consist of fifty sparks. The former was quite enough to actuate a filings coherer, but would merely cause a blow on the telephone diaphragm, whereas the latter would give a short piping note in the receiver.

By increasing the alternating supply voltage or by shortening the spark gap, a large number of sparks can be made to occur during each half cycle, but they will occur too irregularly to produce a musical note, unless steps are taken to make the sparks occur at regular intervals. This can be done by replacing the stationary gap by two disks revolving at high speed, the rims of the disks being provided with projecting knobs, between which the sparks jump.

One of the most recent developments, although hardly yet beyond the experimental stage, is the introduction of the telephone relay. By placing one of the telephone relays, recently invented by S. G. Brown, between the detector and the telephone receiver, signals which are otherwise quite inaudible can be easily read. The Telefunken Company has recently experimented with an apparatus somewhat similar in principle and known as a tone-augmenter.

The distances over which communication can be maintained with a given supply of power depend on the height and size of the aerial, on the nature of the intervening country, and on the type of detector employed. A safe guarantee, under very unfavorable conditions, is about fifty miles per kilowatt of alternator output, but, with favorable conditions and sensitive apparatus, distances of over 500 miles per kilowatt have been covered.

Practically all the radio-telegraphic apparatus working commercially or being installed at the present time is based on the principles here considered; with the exception of the spark gap and the detector employed, the differences are non-essential.

Telegraph Facilities at Trial of McNamara Brothers in Los Angeles.—Special telegraph facilities have been provided at the trial of the McNamara brothers in Los Angeles, Cal., on the charge of dynamiting the Los Angeles *Times* building a year ago. A room has been prepared in the Court House for the accommodation of operators, newspaper correspondents, artists, etc.

Mr. M. A. Cosio, Director-General Mexican Telegraphs.

Mr. Miguel A. Cosio, lately appointed director-general of the Mexican Federal telegraphs, with headquarters in the City of Mexico, has had a long and interesting career in the telegraph and telephone services in that country, although his early training was of a military character. He was born in the city of Toluca, Mexico, May 2, 1855, and received his military education in the military college of Chapultepec, and took part in the assault upon the citadel in 1871. Giving up his military career he entered the service of the Mexican Railway in the City of Mexico and advanced rapidly, becoming chief of various important offices along the line.

In 1878 he entered the service of the Federal telegraphs as chief of the Vera Cruz office, and in 1882 was appointed inspector of the lines of the peninsula of Yucatan, later occupying a similar post in the Northeastern section of the Republic.

In 1884 he was commissioned as chief of the general warehouses of the telegraph department and in 1885 returned to the post of inspector. From this time he filled several important posts until July 8 of this year when he was appointed to his present position.

Mr. Cosio has also filled the positions of professor of telegraphy in the military college of Chapultepec and accountant in the school annex of the General Direction of Telegraphs.

The White House on Wheels.

President Taft is a great traveler and when he is away on his frequent trips he makes things hum for the telegraph and the telephone. His special train is a fully equipped business institution, and carries representatives of a great variety of vocations — telegraph and telephone operators, mail clerks, reporters, secretaries, etc. When he stops en route to make speeches the telegraph and telephone feel the effects of his remarkable activity.

Two Viewpoints of Farming.—Recently we received in one day two requests, one from an operator to change his address because he had left the telegraph service to engage in farming, which he thought was more remunerative. The other was from an old telegrapher who had tried his hand at farming for several years and concluding that there was nothing in it said he proposed to return to the telegraph for employment.

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, has been selected by the international jury. The monument will cost 170,000 francs ($85,000). Three of the minority members of the jury have entered a protest against the award.

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The Passing of the Old.

There is a touch of pathos in a recent letter from Mr. D. H. Fitch, of Cazenovia, N. Y., who looks back with pleasure and pride upon the old days of the telegraph.

He laments the loss of many of his old time associates and no longer sees any familiar names in the pages of the AGE. All is changed to him.

"I am a back number," he says. "I was with the Western Union when its eastern boundaries were Buffalo and Pittsburgh. I was for nearly twenty years a Western Union district, or railroad telegraph superintendent. I had an extensive acquaintance, and some friends among telegraphers. I turn page after page of the AGE and see no familiar names. Where are J. H. Wade, Judge J. D. Caton, Gen. Anson Stager, J. D. Reid, J. J. S. Wilson. E. P. Wright, Geo. T. Williams. J. F. Wallick. T. B. A. David, Charley Weir, Nate Hucker, Yank Sullivan, Toppy Craig, Payne and others? 'Time touched them and they perished.' And now one of my earliest and best friends, Col. Clowry, has had to give way to more modern, if not better methods. I see words in your paper which I do not know the meaning of, and diagrams which look to me like maps of Hades. Homesick, I close its pages and take the paper down to the library, where it will benefit the young and not haunt me any more."

Mr. Fitch is one of the active old-timers and a few points regarding his career will no doubt be interesting at this time.

He learned telegraphy on the "Utica and Oxford Morse Magnetic Telegraph Line" which was in the territory of the late James D. Reid. "We never had a message," he says, "unless someone was sick or dead, except the 'D. H.' which we used to send for the stage drivers. Each operator had a pair of climbers, equally well adapted to flying or climbing, and was required to keep the line repaired to the next office north. Operators were nabobs in those days. At Utica, one morning, I paid four dollars stage fare to Norwich. At Hamilton we stopped for dinner, and I went over to the telegraph office. When I returned the stage agent asked me if I was a telegraph operator. I honestly believed I was and told him so. He refunded the fare and apologized."

Much of the time in 1861, '62 and '63 Mr. Fitch was engaged on river cables and military telegraph work, though yet employed by the Western Union company. He supervised the construction of the line to and put the first telegraph wire into the St. Louis Arsenal in May, 1861, then commanded by Captain, afterwards General, Lyon. While at St. Charles he had charge of transportation on the North Missouri Railroad which of course included military transportation. He resigned December 31, 1864, and returned home, exhausted and sick.

In the spring of 1865 he went with Captain Geo. H. Smith to the sixth district, Central Division, which then embraced the oil region of Pennsylvania, and in 1866 was appointed Mr. Smith's successor as superintendent and remained there until the district was discontinued and annexed to others. While superintendent of this district he originated the "Map and Scale" tariff.

In 1869 Mr. Fitch was superintendent of telegraph on the Missouri Pacific Railroad, and afterwards on other roads. On the Brunswick and Western Railroad in Georgia, in 1884, he was also general passenger and freight agent.

From 1885 to 1892 he manufactured open-circuit batteries, and sold the business to New York manufacturers.

Soon after the expiration of the Bell patent, Mr. Fitch, in 1894, established the Cazenovia, N. Y., exchange, which was probably the first of the independent exchanges. In July, 1902, he sold the exchange to the Cazenovia Telephone Company and has since been its electrician.

[Mr. Geo. T. Williams is living in retirement in Cleveland, Ohio; Mr. J. F. Wallick, at Indianapolis, Ind., and Mr. T. B. A. David at Pittsburgh, Pa. Mr. Nathaniel Hucker is still in telegraph harness at Buffalo, N. Y., where he has been located since 1847.—Ed.]

The New President of the Old Timers.—In a recent letter from Hon. Wm. S. Jordan, of Jacksonville, Fla., the newly-elected president of the Old Time Telegraphers' and Historical Association, that gentleman expresses his appreciation of the honor as follows: "I am glad to hear that the Atlantic City meeting was such an interesting one and I certainly feel especially honored at having been elected president, and that this City should be chosen for the convention in 1912. We are looking forward to your coming, and shall do everything in our power to make your visit a pleasant one."

Mr. W. S. Jordan, of Jacksonville, Fla., president of the Old Time Telegraphers' and Historical Association, has appointed the following as the executive committee in charge of the affairs of the association for the ensuing year: Charles M. Holmes, manager, Western Union Telegraph Company, Gilbert D. Ackerly and Wm. F. C. Fellers, of Jacksonville, Fla.; Wm. T. Gentry and G. W. Ribble. of Atlanta, Ga.

Great Northwestern Election. — The annual general meeting of the shareholders of the Great Northwestern Telegraph Company was held at Toronto, Ont., September 27, when the following directors were elected and officials appointed: Mr. H. P. Dwight, president; Mr. Adam Brown, vice-president. Other directors: Messrs. W. M. Matthews, James Hedley, Hon. J. K. Kerr, K. C.; Aemilius Jarvis, F. B. Hayes, Toronto; Messrs. Newcomb Carlton and J. B. Van Every, New York; Mr. George D. Perry, general manager; Mr. A. C McConnell, secretary and auditor; Mr. D. E. Henry, treasurer.

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Instruction Course in the Elements of Technical Telegraphy.

There apppears to be a general need and demand among telegraphers throughout the country for simple and plain instruction in technical telegraphy, so as to enable them to better understand the apparatus they work and handle daily, and fit them for higher positions.

To meet this demand we have prepared a course of instruction in technical telegraphy, the publication of which began in the October 16 issue of TELEGRAPH AND TELEPHONE AGE. It starts with arithmetic, and carries the student through the work by easy stages, one step following another in natural order.

The mathematics employed are of the simplest character and do not extend beyond elementary algebra. They are given for the benefit of those who may have allowed their knowledge of arithmetic and algebra to become clouded through disuse.

This course will be the most valuable educational matter ever placed before the fraternity. It was prepared as a regular $25.00 course, but it will be free to all subscribers of TELEGRAPH AND TELEPHONE AGE. A liberal installment will appear in each issue.

Some of the subjects covered besides arithmetic and algebra are: Potential, Current, Resistance; the Gravity Battery; Ohm's Law; Wire Resistance; Fall of Potential; Derived Circuits; Battery Arrangement; Magnetism; Electro-Magnetism; Self-Induction, the Induction Coil, the Relay; the Sounder; the Key; the Morse Circuit; Switches; Single circuits in bad weather; Static induction; Testing at terminal stations; Earth; Contact; Swinging faults; Weather contact; Wire Testing at Intermediate Offices; the Detector; Weston instruments, the millianmeter; the Volt-Meter, and a chapter on wire patching.

In addition to all this review questions will be printed at the end of each chapter and the student will have to study the original articles to enable him to answer the questions. This is the most simple and effective method of acquiring a technical telegraphic education and the plan has received the heartiest commendation from high telegraph officials and experts.

Everyone interested should see that this matter is brought to the attention of those who desire to better their condition.

Further information may be obtained of Mr. J. B. Taltavall, publisher, TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Mr. W. B. Eddy, an old time telegrapher and now in the telephone service at Albany, N. Y., in renewing his subscription, writes: "Reading TELEGRAPH AND TELEPHONE AGE seems next to a personal visit with many of my life-long friends among the telegraph fraternity whose names are frequently mentioned. Now that the telephone is combined it will still be of greater value to me."

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," 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.

"A Postal operator" writes: "I have read the description in your issue of September 16 of the new Postal switchboard and the 'questions and answers' regarding it in your issue of October 1 and I am free to say that I have received more enlightenment on this subject from these two articles than I could have received in any other way. I feel quite thoroughly posted on standard switchboard practice through this clear presentation of the subject."

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Telephones in England and the United States.*

BY T. F. PURVES, OF LONDON, ENGLAND.

(*Concluded from page 638, October 1.*)

All telephone engineers are at the present time keenly interested in the subject of automatic exchanges, and we did not fail while in America to see all that there was to be seen in that direction. The main idea of automatic working is to reduce the working costs of exchange services by enabling a subscriber to obtain the connection he requires by his own action and without the necessity for employing operators, but improvement in speed of service is also claimed. Each telephone instrument is provided with a mechanical calling device by means of which the person desiring to speak can, in a very simple manner, transmit the number of the party wanted.

In some systems this calling device includes a series of small levers, each of which is pulled forward to a position corresponding to one digit of the number to be signalled. In other systems it consists of a simple rotatable dial with ten numbers, 0 to 9, marked around its periphery, and a call for any number is sent in by turning the dial to zero from the position corresponding to each digit in the number successively. The signalling of each digit sends in a train of electrical impulses which actuate selecting and connecting mechanism at the exchange and so effect connection with the wanted line. The original conception of such a system is now over twenty years old and is generally ascribed to Mr. Strowger. During the past five or six years great strides have been made both in designing and perfecting automatic systems and in establishing working installations. At the present time there are not less than 250,000 telephones working through automatic exchanges in the United States. More than 95 per cent. of these are on the Strowger system, and the remainder are the product of other companies whose engineers have devised systems both notable and effective.

Semi-automatic systems are also pushing themselves to the front. For semi-automatic working a subscriber only requires an ordinary common battery telephone. The attention of an exchange operator is gained in the usual way by lifting the receiver, and the automatic mechanism is set in motion by the operator. She receives the required number verbally from the calling subscriber and taps it out on sets of numbered plungers; the machines do the rest. The speed at which the operator can handle calls in this way is far greater than is possible on an ordinary manual switchboard, where she has to connect the calls through by means of plugs and cords, and to test and ring on the wanted line.

The actual selecting mechanism for semi-automatic exchanges is practically identical with that used on full automatic systems.

As a rule automatic exchanges include also a system of warning signals to attract the attention of the attendants to any failure of the apparatus to perform its functions properly, and means have also to be provided for obtaining connection to trunk circuits and other exchanges, manual or automatic, in the same area. Indeed, there are a good many simpler things to be found on this planet than an automatic telephone exchange.

Up to the present the great Bell companies in America—the companies whose engineers have shown the way to the world in the construction of manual exchange switchboards—have refused to touch automatics, and have consistently maintained a keenly critical attitude with regard to them. All the development of automatic working which has taken place has been in the systems of independent companies. At the present moment the independent telephone company in Chicago—the Illinois Tunnel Company—is installing an automatic system for 80,000 subscribers in eight exchanges of 10,000 lines each. All these exchanges will be inter-connected and work together as a single unit. The apparatus equipment is planned on a basis which will permit of the ultimate extension of the system to practically one million lines.

As already mentioned, the Bell companies are not yet converted to the automatic system, nor do they admit that the public can be expected to handle the automatic telephone successfully. But they have apparently now reached the stage of admitting that the exchange portions of the apparatus, at any rate, promise to work satisfactorily, for they have commissioned the Western Electric Company to work out for them a semi-automatic system. This system is now working in New York in an experimental form. The installation only includes 500 lines, but it is designed on a plan that will provide for ultimate extension to serve nearly two millions of inter-communicating subscribers, whose lines may terminate in, say, 100 exchanges of 20,000 lines each. So the needs of the largest cities for many years to come are being fully kept in mind.

The semi-automatic system which the Western Electric Company has designed is on an entirely original and novel plan and is a miracle of ingenuity. It can readily be adapted to the requirements of full automatic working, and the company's engineers have, in fact, a scheme fully matured for this purpose. Its system, in either of its forms, is bound to be a formidable competitor with other systems in the struggle which may ultimately be expected to result in the survival of the fittest.

The Post Office has now determined to make a trial of automatic exchanges in this country. The first move will be to "try it on the dog," by having an installation to serve as the official switch system at the General Post Office, and it will not be long before two or more systems are working in public exchanges also. It is only in this way that it can be ascertained whether the British public will take kindly to such devices. So far as

*From "The Post Office Electrical Engineers' Journal," London.

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America is concerned, we took every available opportunity of getting at the attitude of the public. We visited many subscribers who are connected both to the automatic system and to the competing manual system of the Bell companies, and I am bound to say that in the great majority of cases we have found a decided preference for the automatic. Of course the crux of the question is —Will the automatic be cheaper to instal and work than the manual system? Will it enable rates to be reduced to the public? If so, its success is assured. There is naturally a big saving in the elimination of operators, but against that has to be set increased cost for skilled mechanics for maintenance, and probably more rapid deterioration of the apparatus. If it should prove that there is no appreciable difference in cost, I for one should prefer to keep on with the manual system. I think it is much better as a general social proposition to pay operators for doing positive useful work than to spend the same amount in paying men to hunt for faults in complicated mechanism, and to cure trouble after it has arisen. All the same, I believe that in one form or another automatics have come to stay.

The development of "farmers' lines" is a distinctively American product, and is largely due to the initiative of the people themselves, who had contructed a great many lines in far out-lying country districts before the telephone companies had made the discovery that there was a big revenue to be derived from the cultivation of such rural services. Some very weird productions were to be found among the lines built by the farmers in the earlier days. An extra long post in the snake-fences here and there, with a bit of fencing wire strung along on broken bottle necks spiked to the top of them, to serve as insulators, was all that was wanted to put ten or a dozen farmers into useful communication with one another. Now the lines are a little better constructed, but to a great extent the farmers still build them for themselves. Many firms of telephone suppliers all over the country cater for their wants. Each telephone has a powerful hand generator, and the calls reach all the parties on the line. A code of signalling has therefore to be arranged, so that each may know when he is wanted, and when the number of parties on a line is more than six a system of combinations of long and short rings is used. Of course, everyone can overhear his neighbor's business if he wants to; it has even been said that this is one of the main reasons for the popularity of the system!

With all its quaint associations the farmers' line is still a splendid thing for rural America. It has wonderfully mitigated the loneliness of life in the small farms that are dotted about over so many thousands of square miles, and in every way it has brought great business benefits to the farmers as well.

Of the many things we saw and admired in the telephone world of America, there is none that impressed me more than the quality of their organization, the statesmanlike ideas which underlie it, and the hearty way in which all appear to believe in it and to support it. This organization is typical of general American methods, and to it much of the national success is due. Its three fundamental ideas are reasonable specialization, devolution of responsibilities, and direct co-operation between officers whose work is associated. One of the most salient points of the American organization to an engineering man is the broad-minded definition given to the word "engineering." The chief engineer of the American Telephone and Telegraph Company has under him "traffic" engineers as well as "plant" engineers, and is thus able to deal effectively with the development and requirements of the services as a whole, and to formulate standards of construction and of operating practice in proper relationship with each other, for the instruction and guidance of all the associated Bell companies, and of the wide telegraph interests which are also under his control. These telegraph interests were formerly restricted to the leasing of "private wire" circuits superimposed on the long-distance telephone lines, but they have recently been greatly extended by the practical acquisition by the American Telephone and Telegraph Company, of the Western Union Telegraph Company, with its cable system and extensive inland telegraph business. The amalgamation was, I believe, largely due to recognition of the benefits which would result from the co-ordination of the two services, and the best methods of doing so are now being actively studied.

The value of regular statistics is much appreciated in America as a means of supervising the working of large commercial organizations of all kinds, and the greatest attention is paid to framing them systematically on lines which will yield the essential information required by controlling officers. The telephone companies are no exception in this respect. We were informed that the leading ideas in organizing statistical methods are, first, that no man shall be asked to furnish statistics which are not of practical use to himself in gauging the success of the work for which he is responsible, and, second, that the system of standard records shall be so complete as to avoid, to the utmost possible extent, any necessity for calling upon the staff to interrupt their normal duties for the compilation of special returns. The records pass through many hands and many processes of refinement, useful at each stage, before they ultimately reach the heads of the company in a shape which enables the working of every important branch of the business to be reviewed in terms of the all-important criterion—dollars and cents.

The apparent harmony with which all classes work together in the American services is striking. Two or three times I commented on this, and the reply in each case was to the same effect —"Employ high-grade men and there will be no friction."

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INDUSTRIAL NEWS.

Electrical Measuring Instruments.

Messrs. Foote, Pierson and Company, New York, have recently put upon the market a new improved switch set, which is very compact and designed for quick and accurate work. It consists of a Wheatstone bridge, rheostat, battery and galvanometer keys, special switches for short circuiting these keys, and switch and binding posts for ground connection.

The switches, contacts, etc., are mounted on a polished rubber plate, and are contained in a polished mahogany case, making a very handsome as well as serviceable instrument.

The rheostat comprises four arms—10 units, 10 tens, 10 hundreds and 9 thousands, and "open,"

IMPROVED MEASURING INSTRUMENT.

making a total of 10,110 ohms. These resistances are arranged in series, having a zero contact at the beginning of each set.

The bridge arms consist of three coils of 10,100 and 1,000 ohms, so arranged that in connection with the rheostat the set will measure from 0.01 ohm to 1,011,000 ohms. The resistance is varied by means of three-leaf switches moving over platinum-faced contacts.

Catalogue No. 26, issued by the firm, gives complete information regarding the line of electrical measuring and scientific apparatus manufactured and sold by it. The illustrations are particularly clear and are accompanied by diagrams showing details, connections, etc.

A Telephone Train Dispatching System Paralleling a High Tension Transmission Line.—The New York, Westchester and Boston Railroad is now installing telephone equipment which is particularly interesting because of the fact that it is the first installation of a telephone train dispatching system paralleled by high tension, single-phase circuits. The telephone system will be complete, consisting of train dispatchers' circuits and message wire circuits of various kinds. All the circuits, with the exception of the train wires, will be provided with intercommunicating features. As this road is electrically operated on 11,000-volt, 25-cycle, single-phase circuits, it was decided to make the distribution system of underground cable. The layout for the complete telephone system had to be designed for future extension and to afford good transmission through considerable cable. The dispatcher's office will be located at the 180th St. Station, New York, as will also the message operator, who will monitor the various message circuits and have charge of the local telephone service through a special switchboard. The complete equipment was furnished by the Western Electric Company.

Useful Telephone Booklet.—The Kellogg Switchboard and Supply Company, Chicago, Ill., has issued a booklet entitled "Things Telephone Users Should Know About Telephone Systems and Service." The pamphlet explains in non-technical language the different kinds of telephones, their construction and use so that anyone may become more familiar with the instrument and its operation, and the information given will no doubt go a great way toward making friends for the telephone. The booklet is written by Mr. H. N. Faris, who has had a long and wide experience in the practical telephone field.

Western Electric Company's Business.—The statement of the Western Electric Company's business during August shows a falling off in gross sales of three per cent as compared with the sales of the same month in 1910. Although four out of the last five months have shown a decrease in gross business, the falling off has been so slight that the increase in the first three months is sufficient to make the whole eight months that have elapsed show a gain of three per cent over the corresponding eight months of 1910. The company has 26,000 employes on its payrolls.

Fifteen Thousand Feet of Cable Manufactured in Two Days.

In making 15,000 feet of 100-pair lead covered cable in two days the Western Electric Company recently set a new record. The hurricane which swept over Charleston, S. C., last month left that city isolated from the rest of the world, as far as communication was concerned. The Southern Bell Telephone Company made such heroic efforts to put its plant in operation again that service was resumed in a remarkably short time. More lead covered cable was needed, however, and the telephone company called up the Atlanta office of the Western Electric Company and placed an emergency order for 15,000 feet of 100-pair cable. The Atlanta house immediately wired the company's cable plant at Hawthorne, Ill. Two days later this 15,000 feet of cable was on its way. In two days nearly three miles of 100-pair cable had been manufactured, placed on huge reels and shipped.

Mr. I. N. Sharpnack, manager, Western Union Telegraph Company, Parkersburg, W. Va., in renewing his subscription for another year and changing his address to his house, writes: "I have no time to read the paper at the office. The AGE makes the fireside brighter."

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How News Is Transmitted to Daily Papers on Atlantic Steamers.

Under the caption "Journalism at Sea," the September *Marconigraph* gives an interesting description of the Cape Cod, Mass., station, and how the news is transmitted to and received by steamers at sea for publication in the daily papers issued on board.

Every day in the year at 8.30 p. m. a special despatch is prepared at the Associated Press office in New York and telegraphed direct to the Marconi station at Cape Cod, South Wellfleet, Mass. From here, by means of wireless telegraphy, the world's news is sent out to vessels hundreds of miles distant on the Atlantic. The aerial wires supported by the masts of each steamer intercept a sufficient number of the ether vibrations sent out by the Cape Cod transmitter to operate the sensitive receiving apparatus, the operator records the message, and in the morning the traveler finds the news that has come so far and has been printed while he slept.

The plant of the Cape Cod station is about two miles from the railway station at South Wellfleet, Mass., and is situated directly on a sand bluff that overlooks the Atlantic Ocean.

Four huge towers, each two hundred and fifteen feet high, support a network of copper wires, the lower ends of which lead into the transmitting room. These wires, when charged, set in vibration the ether for fifteen hundred miles around. Under the shade of these towers nestle the several buildings containing the plant. A low brick structure houses the great engines and humming dynamos that furnish the necessary power for the transmission of messages to great distances. Under the same roof is also located a large storage battery and a machine-shop. Connected to this building by a long corridor are the transmitting and operating rooms, in which occur the wonderful display of electrical pyrotechnics that has caused the plant to be dubbed "Marconi's thunder factory."

About a thousand feet from the plant is situated a comfortable bungalow that shelters the men employed at the station. There is a plank walk from the plant to the house and many are the tales told of trying to keep to the path on a stormy night when the ground is covered with snow and the air full of blinding sleet, or of endeavoring to reach the bungalow when a fierce wind is blowing that drives the loose sand against the men's faces with such force as almost to draw blood. On one occasion during a heavy storm the manager became confused in attempting to make the passage from the house to the plant and only succeeded in reaching his destination by following the wire fence which encloses the grounds for its entire length.

The staff consists of a manager, two telegraph operators, two engineers and two old salts as riggers, a chef and steward, and two dogs. The manager is the technical man and wireless engineer of the plant, in addition to his position as head of the family. The two telegraph operators take shifts in working the land lines and wireless circuits, for this station is also used for communication with Boston shipping. The engineers stand watch on alternate nights to start the main engines and to keep them running smoothly. There are also a thousand and one things for them to do during the day—some repairing, improvements to be made or experiments for the engineer at the head office in New York. The riggers keep the towers and stays in ship shape.

There are various tasks to engage the men during the daytime, but it is at night that the real work of the station begins. At 8.30 p. m. the operator on duty hears a call on the land line, and he is at once busy copying on his typewriter the news despatch from the Associated Press. He then takes his copy down to the plant and starts punching the strip. This operation is one recently added to the daily régime, and is the means by which the entire news message is sent automatically in perfect Morse characters without the operator touching a key. In order to ensure the receiving of the message by the ships at sea, many of which are at distances too great to ask for repetitions of certain words they may have missed, the entire news despatch is repeated several times. In the days when the operator must needs send this long message four times by means of a huge telegraph key, in addition to receiving it from New York over the land line, the news became rather a bore, especially when the hours of the morning were small and the man's eyes heavy for sleep. The message having been punched on the paper, the strip is then wound on a reel attached to the motor-driven automatic transmitter, and is then ready for the programme, which starts at 10 o'clock each night and continues until completed.

At 9.30 the engineer on watch hastens down from the dwelling house to the plant and starts three great flaming torches, in order to heat the ignition balls of the kerosene engines. Oil engines are used in this plant because of the high cost of coal and the difficulty of delivering it at the station. By 9.50 o'clock all is in readiness—the engines are running and the recording instruments are inspected to note whether the current value is correct. When the clock points exactly at ten a red signal light flashes in the engine room, the operator releases the catch on the automatic transmitter and the crashing noise of the spark is immediately heard in the adjoining room. Here in the transmitting room great streams of fire a foot long are thrown out by powerful blowers and the tremendous noise of the spark, though musical, is terrifying. Very few persons have seen this plant in operation, for visitors are strictly prohibited from entering upon the premises, but one may hear the high-pitched note of the powerful spark for several miles if the night be quiet or the wind favorable. Through the windows of the station the spark has been seen for fifteen miles at sea. Viewed from the exterior, the intense white flash showing through the ground glass windows of the instrument room and the deafening crash of the spark would cause one to believe that here is the home of the Evil One. In this way the great plant is calling to ships near and far, and sending them the news of the day. The ships may

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be fifteen hundred miles or only one hundred miles away, and, unless the vessel is at the greater distance, the operator usually copies the complete despatch correctly the first time without recourse to the repetitions that follow.

While the operator at Cape Cod is busy sending out the day's despatch, on each one of the numerous ships on the broad Atlantic there listens an attentive ear.

Between the masts of each vessel are strung horizontally several stranded copper wires about the diameter of a pencil. These wires are separated by wooden spreaders and carefully insulated by special hard rubber insulators from the masts and their attendant stays. Several vertical wires are connected at the centre of the horizontal ones, and these lead directly through an insulator into the wireless cabin, usually located on the upper deck. Here are the special and sensitive instruments in which we are particularly interested. This room is especially constructed with sound-proof walls, several inches thick, and lined with cork. These more modern accommodations are in marked contrast to the quarters on the older vessels with which the operators had to content themselves.

Each night, a few minutes before ten, the operator in charge shuts himself in the little sound-proot room, provides himself with pad and pencil, adjusts the pair of telephone receivers to his head and awaits the stroke of ten. Exactly on the minute, the faintest little whisper is heard in the telephones. The giant spark at Cape Cod is saying, "Good evening, ships, good evening, ships." These signals, though somewhat faint, are quite distinct, and may be likened to the gentle purring of a contented kitten, though they are not so loud.

Quite recently it has been discovered that the human ear is more sensitive to a higher musical note than that which was produced by the spark formerly in use, which was at the rate of four thousand sparks per minute. The new musical spark has a frequency of thirty-six thousand impulses per minute, and is readable at considerably greater distances with the same power. In the meanwhile, with receivers tightly pressed against his ears, the operator is rapidly writing down pages of news. This continues for about an hour, at the end of which time the despatch is complete. The copy is then quickly transcribed on the typewriter and hurried down to the "editor on board" of the *Atlantic Daily News*.

When the copy is ready it is turned over to the typesetter, who prepares the type in the good old way in vogue in newspaper offices before the advent of the linotype machine. By long practice he has become very deft, and in a short time all is complete and passed over to the printer for his part of the work. The forms are rapidly adjusted to the motor-driven press.

The first wireless newspaper to be published on board a vessel crossing the Atlantic was a little sheet known as the *Transatlantic Times*. It appeared November 15, 1899, and was published on board the American line steamer "St. Paul," *en route* for England. On this voyage the St. Paul carried Mr. Marconi and two of his engineers, returning from America, where they had been carrying on experiments with a new kind of telegraphy. The particular object of their visit had been to report the yacht races for the Associated Press, and as success had crowned their efforts, they were looking for new worlds to conquer. They decided to publish a newspaper on board ship, and obtained the latest news of interest from the Marconi station at The Needles. The papers were neatly printed, and were sold at a dollar a copy for the benefit of the Seamen's Fund. From this small beginning the idea gradually grew until the erection of high power stations at Cape Cod and Poldhu made possible the constant reception of news from land and a daily issue.

The *Atlantic Daily News* is a paper of from eight to ten pages, and is printed in the form of a magazine. On the outside cover there is a copy of some famous painting, a photograph of some prominent man, or an illustration of some article within. There are many items of interest in the paper, news from all parts of the globe, the quotations of the Stock Exchange, the latest gossip of the sporting world.

The papers are most eagerly sought after by the passengers, and they are scanned with absorbing interest. It is the great event of the day on shipboard, and conversation turns to the facts that have been made known by the advent of the little sheet. Of course, the barest facts are all that can appear in news despatches that aim to send as much information as possible in as short a form as is commensurate with making sense.

For the last five years newspapers have been published daily on the Atlantic liners. From the individual efforts of the steamship companies, each of which printed its own paper with its own title, has developed a publication with an issue of several thousand copies daily, with a single management for all the lines.

Free Lectures on Electricity.—The Department of Education of New York City has arranged for the usual free lecture service during the winter months. Prof. W. Wallace Ker, of the Hebrew Technical Institute, will give a course both in Manhattan and Brooklyn on the principles and practice of electrical engineering. Other lectures will be on elementary electrical science, by Messrs. J. Newton Gray, Frederick W. Huntington and Charles L. Harrington and Prof. John S. McKay.

Substitute for Platinum.—Owing to the limited supply of platinum there is a pressing demand for a substitute, especially in electrical work. The principal source of supply is Russia. A little platinum is produced in this country as a by-product in placer mining. A fortune awaits the man who succeeds in inventing a substitute for this precious metal, and here is an opportunity for our readers of an inventive turn of mind to make their mark in the world.

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The Railroad.

Educational Meeting of Pennsylvania R. R. Telegraphers.—About one hundred telegraphers and other employes of the telegraph department of the Pennsylvania Lines east of Pittsburgh and Erie, held their monthly meeting in Buffalo, September 23. Mr. J. C. Johnson, of Philadelphia, superintendent of telegraph, presided and Dr. R. H. Hough, of Philadelphia, read a paper on technical problems.

Telephone Train Dispatching on Atlantic Coast Line.—The Atlantic Coast Line Railroad, W. P. Cline, superintendent of telegraph, which has had for some time 167 Gill selectors in service in its telephone train dispatching and message service, has received from the United States Electric Company, New York, 98 additional Gill selector equipments, which are being installed in extension of the system to Jacksonville, Fla.

Reading Telegraph Company Meeting.—At the annual meeting in Reading, Pa., on October 2, of the Philadelphia, Reading & Pottsville Telegraph Company, which is a subsidiary of the Philadelphia & Reading Railroad, and works in connection with the Western Union Telegraph Company, the following officers were elected: President, George F. Baer; secretary, H. E. Paiseley; treasurer, W. R. Taylor. Mr. C. M. Lewis, Reading, Pa., is superintendent of telegraph.

Telephone Train Dispatching on the Toledo and Ohio Central.—The Toledo and Ohio Central Railroad, which recently adopted the telephone for dispatching trains on its eastern division, has recently placed another order with the Western Electric Company for thirty-one telephone selectors for use on its western division. This new circuit will extend from Columbus, where the dispatcher will be located, to the Union Station at Toledo, a distance of 132 miles. When both circuits are completed the Toledo and Ohio Central will be operating 280 miles of track by telephone.

Baltimore & Ohio Adds over 300 Miles of Telephone Train Dispatching Circuits.—The Baltimore and Ohio Railroad has recently placed an order with the Western Electric Company for eighty-five of its selectors for use on five new circuits. Between Rockwood, Pa., and Johnstown, Pa., a distance of forty-five miles, there will be two circuits, each equipped with nine stations. One circuit will be used for train dispatching and the other for an intercalling message circuit. The dispatcher for both circuits will be located at Rockwood.

There will also be a train circuit running from Newark, Ohio, to Cambridge, Ohio, a distance of fifty-two miles. Between these two points another train circuit will be run as an open circuit, and from Cambridge to Bernwood Junction, Ohio, there will be installed fifteen selector equipments. The total distance of the line will be 105 miles. The dispatcher for both of these circuits will be located at Newark.

In addition, an intercalling message circuit will parallel the train wires running from Newark to Bernwood Junction, a distance of 105 miles. The dispatcher for this circuit will be located at Newark, and twenty-eight stations will be equipped.

Telephone Dispatching on the Cincinnati, Hamilton and Dayton.—The Cincinnati, Hamilton and Dayton Railroad has recently placed an order with the Western Electric Company for seventy-nine of its telephone selectors and associated telephone apparatus to equip three new circuits. One circuit will extend from Indianapolis, Ind., to Hamilton, Ohio, a distance of 99 miles, and on it twenty-one selector station equipments will be installed. The dispatcher will be located at Indianapolis. The second circuit will extend from Dayton, to Cincinnati, Ohio, a distance of sixty miles, and will be equipped with twenty-four station outfits, the dispatcher being located at Dayton, and the third circuit will extend from Dayton, Ohio, to Toledo, Ohio, a distance of 140 miles, with thirty-four stations. The dispatcher for this circuit will also be located at Dayton.

B. S. Jenkins, Superintendent of Telegraph, Canadian Pacific Railway.

Mr. B. S. Jenkins, general superintendent of the Canadian Pacific Railway Telegraphs, Western Lines, is the subject of an interesting personal sketch in the *Manitoba Free Press*, of Winnipeg, Man. Mr. Jenkins has just completed thirty years' continous service with the company, during which time he has been prominently identified with the railway company's telegraph system.

Mr. Jenkins was born at Richmond Hill, Ontario, April 8, 1859, and entered the service of the Canadian Pacific Railway, September 21, 1881, as operator at Boniface Junction, opposite Winnipeg. In July 1883, he was appointed superintendent of telegraphs covering the western dvision of the Canadian Pacific and in December, 1899, was made general superintendent of telegraphs of the company's western lines, from Port Arthur to the west coast of Vancouver Island. Mr. Jenkins, it is stated, is the senior telegraph official of the system, and is one of the leading citizens of Winnipeg.

Federal Ownership of Telegraphs.—Congressman W. B. Francis, of Ohio, appeared before the National Good Roads Congress, held in Chicago recently, and advocated Federal ownership of telegraph lines along public highways, the highways to extend across the continent and north and south. He proposed that the revenues from the telegraph system be used in keeping the roads in repair.

Mr. J. W. Atkins, manager of the Western Union Telegraph Company at Key West, Fla., on being told that we had renewed his subscription for another year writes: "I wish you to do the same thing yearly."

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Dispatching of Trains by Telephone*.

BY W. W. RYDER, GENERAL SUPERINTENDENT OF TELEGRAPH, NEW YORK CENTRAL LINES, CHICAGO, ILL.

The usefulness of the telephone in place of the telegraph as a means of communication between railway stations was early recognized, and in fact, on some roads the telephone was used in the handling of trains as early as 1883, but it was not until the fall of 1907 that the telephone was used exclusively for such service on a busy main line. In October, 1907, the New York Central established a telephone dispatching circuit between Albany and Fonda, N. Y., a distance of forty-six miles, and the Chicago, Burlington and Quincy made a similar installation between Aurora and Mendota, forty-five miles, the following December.

Success was evident from the start, and other roads becoming interested have adopted the practice, until now about 36% of the entire railway mileage in the United States is so operated. The following figures, taken from the Government report of January 1, 1911, show the extent to which some of the principal railroads had adopted this method of dispatching:

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

Now let us consider some of the reasons for this remarkable growth, or, in other words, the real advantages gained by this substitution.

First is the aid to the dispatcher in that his work is handled more easily as well as more expeditiously. By reason of the quickness with which communications may be passed, he is able to keep up his train sheet in better shape than ever before and with much less actual physical effort. Also the same fact of quickened transmission relieves the tendency of condensing or restricting information which might be of great value if given, but which, with the telegraph, was often omitted because of the time it took to spell out letter by letter every word and figure of such information. The dispatcher is also able, whenever he so desires, to talk directly with the conductor or engineer, and is thus able to secure a more accurate knowledge of the actual details than was ever possible through the use of the telegraph. Also his attention in case of emergency can be much more promptly secured than is possible with the use of the telegraph.

Another advantage is the promptness with which operators respond to their calls. In telegraph practice, a call for any one office is heard with equal clearness in all the other offices on the circuit and is not always immediately answered by the operator desired, even when his attention is finally attracted. During this time the telegraph wire cannot be used for any other purpose than the calling. With the telephone the call consists in the ringing of a large vibrating electric bell in the particular office wanted and is not heard in any other office; consequently, when once these bells begins to ring, anyone within hearing knows that particular office is being called. As a result, operators answer more promptly and the time of the dispatcher, consumed in the constant repetition of the telegraph call, is saved. It is also possible to put out a call on the telephone circuit while a conversation is in progress.

Another important improvement is the fact that the telephone works much better in wet, foggy weather than does the telegraph, and experience has also demonstrated the fact that it will work during storm prostrations where the telegraph, under similar conditions, would be absolutely inoperative. The telephone also works better in territory where inductive disturbances from trolley lines and high tension power circuits interfere with the operation of the telegraph, and these conditions are rapidly multiplying.

With the use of the telephone it is possible to provide satisfactorily for communication to and from blind sidings and it makes possible oftentimes, the closing of unimportant offices for a portion of the day or night where heretofore telegraph operators were required chiefly for possible emergencies. Telephones are so placed at such offices that the conductor can get in direct touch with the dispatcher if necessity requires.

The train and engine men are in favor of the change, for they recognize that it helps get them over the road more promptly, minimizing the delays on side tracks waiting for the dispatcher to get time to move them. They also realize the benefit of being able personally to talk over with the dispatcher the little matters that are constantly arising that affect train movement. In fact, the spirit of harmony and co-operation between dispatchers, operators and train and engine men has greatly increased since the telephone has brought them into closer personal touch and with corresponding gain in efficiency and discipline.

The telephone is also rapidly replacing the telegraph in the handling of way-office messages, it having been found possible to handle from 50 to 75% more business over a way telephone circuit in a given time than is possible with a similar telegraph circuit. This, of course, means more prompt service, and a further postponement of the necessity for increasing facilities.

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

* From Bell Telephone News.

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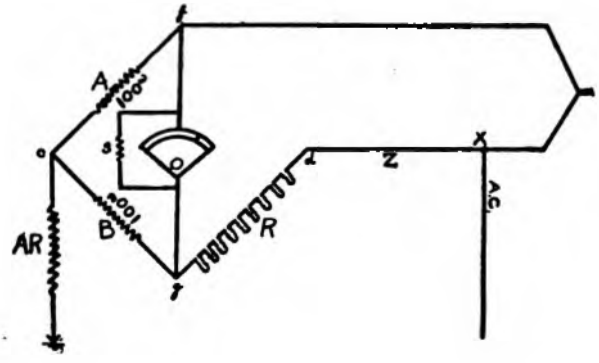
more reliable, more flexible, and in addition makes possible better discipline and co-operation between the dispatcher and operators, as well as providing means for officials who are not familiar with the Morse code to obtain immediate and accurate information in cases of emergency, and thus be in better shape to exercise personal supervision.

Test for Locating Alternating-Current Crosses.

BY A. J. EAVES, ELECTRICAL ENGINEER'S OFFICE, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The accompanying diagram shows the connections of a method for locating alternating-current crosses on telegraph lines:

Disconnect the battery wires at *c* and *d* of a Wheatstone bridge set and ground the point *c* through a resistance *AR* sufficient to reduce the incoming alternating-current below the danger point, and then substitute for the galvanometer an alternating current mil-ammeter, shunted with about 10 ohms resistance, *s*, as a protection to the instrument. Balance the bridge by inserting resistance in the rheostat *R* until the needle points to zero, on the lower scale of the mil-ammeter, which indicates that no current flows between *f* and *g*. Then half of the



LOCATING ALTERNATING-CURRENT CROSSES.

resistance of the rheostat *R* will be equal to the distance in ohms from the point the crossed wire is looped with the good wire to the alternating current cross, if the two wires are of approximately the same resistance.

To determine the distance in miles from the test station to the cross, make a loop measurement of the good and crossed wires before the battery wires are disconnected from the bridge and use the Varley formula:

Where M = Length of loop in miles.
O = Resistance of loop in ohms.
R = Resistance of rheostat when bridge is balanced.

$$Z = \frac{O-R}{2}$$ = Resistance from testing station to cross.

Then the distance in miles from the test station to the cross is

$$X = \frac{Z \times M}{O}$$

By using a telephone receiver instead of an alternating current mil-ammeter the same result can be obtained by inserting resistance in the rheostat *R* until no noise, or a minimum noise, is heard in the receiver.

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. 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 large command or division has a special telephone corps attached, which consists of trained telephone men under the comman 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 20 minutes to lay 0.6 miles. 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 only 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 wires 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.—*Telephone Engineer.*

Mr. F. C. Hackett, former manager of the Western Union Telegraph Company at Cleveland and Toledo, Ohio, and elsewhere, now in other business, in renewing his subscription says: "Even though I am out of the active telegraph service, I look forward with great pleasure to receiving my copy of TELEGRAPH AND TELEPHONE AGE twice a month."

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Meeting of Western Union Managers in St. Louis.

A meeting of the managers of most of the important offices in the second district, Western Division, of the Western Union Telegraph Company, was held in St. Louis, September 20, in the office of district commercial superintendent W. R. Chapman, the object of the meeting being to discuss informally matters of general interest to the telegraph service, enable the managers to become better acquainted with one another and avail themselves of the benefits that result from an exchange of ideas as to methods which obtain at their respective offices. The relationship between the telegraph and telephone companies, new system of auditing, methods of soliciting, courtesy of employes, etc., all came in for discussion, and the various new forms now being used by the telegraph company, and which are meeting with such favor, were carefully considered and explained.

Every manager agreed that the meeting had been most helpful in every way and had inspired them with a determination to spread out in every direction from the routine in which they had fallen.

After the business session, which lasted five hours, the party was entertained at an elaborate luncheon at the Mercantile Club, followed by a theatre party at the Columbia Theatre.

In addition to district superintendents W. J. Armstrong and W. R. Chapman, chief clerk Callahan of the commercial department and special agent Edwards, those in attendance were: R. H. Bohle, St. Louis; G. W. Brownson, Kansas City, Mo.; J. A. Crawford, St. Joseph, Mo.; E. C. Newton, Little Rock, Ark.; H. L. Arnold, Hot Springs, Ark.; H. C. Stannard, Fort Smith, Ark.; E. M. Haldeman, Texarkana, Ark.; E. A. Rippey, Springfield, Mo.; R. J. Volker, Jefferson City, Mo.; F. E. Gibbons, Sedalia, Mo.; W. Elrod, Carthage, Mo.; O. O. Horner, Helena, Ark.; J. B. McLeod, Jonesboro, Ark.; E. R. Potter, Fayetteville, Ark.; H. E. Johnson, Poplar Bluff, Mo.; F. W. Hoyler, Pine Bluff, Ark.; J. H. Napier, Moberly, Mo.; C. McNeill, branch office manager, St. Louis.

The greater number of managers who attended the meeting left for home on the night train, but several remained to talk over matters peculiar to their respective localities.

A message received from division commercial superintendent M. T. Cook explained that owing to important business matters, which had just come up, it would be impossible for the division officials to be present as was expected. He expressed a hope that the meeting might prove a success and wished the managers an enjoyable time.

Dominion Telegraph Company.—The assets of the Dominion Telegraph Company of Canada according to the recent annual report, were $1,310,530 and the liabilities $1,016,860, leaving a balance of $293,670. Following are the officers and directors for the current year: President, T. Swinyard, vice-president, Sir Henry M. Pellatt, secretary-treasurer, F. Roper; other directors, B. Brooks, T. F. Clark, R. C. Clowry, Æ. Jarvis, C. O'Reilly and A. G. Ramsay.

Poles Purchased in 1910.

A preliminary statement showing the number of poles purchased by the telephone and telegraph, steam and electric railroad, and electric light and power companies in the United States during the years 1910, 1909, 1908 and 1907, has been issued by Census Director E. Dana Durand, Washington, D. C.

Of the 3,870,694 poles purchased during 1910, 2,831,810, or 73.2 per cent., were reported by telephone and telegraph companies, and 305,792, or 7.9 per cent., by steam railroad companies. The number reported by the telephone and telegraph companies, however, was slightly less than in the preceding year, the decrease amounting to 84,195.

While 28 different woods were reported as drawn upon for pole material during 1910, four species—cedar, chestnut, oak and pine, ranking in the order given—contributed more than 90 per cent. of the total during each of the four years covered by the report. Among the woods used in relatively smaller quantities as pole material a marked decrease is noted in the case of cypress.

An interesting fact disclosed by the figures is the rapid growth of the practice of treating poles in order to prolong their period of use.

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The Turner Monument Fund.

The bronze tablet for the Turner monument, an illustration of which was published in our issue for October 1, has received general commendation, and is characterized as a highly artistic piece of work. It reflects great credit upon the sculptor, Mr. Charles Keck, of New York. Mrs. E. H. Harriman, of Arden, N. Y., has generously provided for the stone work and the construction of the monument.

Mr. Charles T. Ford, of Central Valley, N. Y., superintendent of the Harriman estate, is supervising the stone work and is an enthusiastic worker for the success of the monument project.

As the time for the dedication approaches, those who have not yet contributed to the fund should take the matter up before the close. Everyone interested in the railroad in any capacity should consider it a privilege to contribute toward this worthy cause, however small the amount may be.

Mr. J. B. Taltavall, 253 Broadway, New York, is treasurer of the fund and will be glad to hear from anyone who wishes to be identified financially with this worthy movement; all contributions are acknowledged in the columns of TELEGRAPH AND TELEPHONE AGE. The amounts received up to date aggregate $1,675.49, and it is desired to increase the fund as far as possible so as to insure a fitting ceremony at the unveiling next month at Harriman, N. Y.

Mr. E. P. Griffith, superintendent of telegraph of the Erie Railroad, chairman of the committee, expects to soon issue the dedication invitations. Mr. Henry D. Estabrook, of New York has been selected as the orator on the occasion of the unveiling. He has a national reputation as a speaker of unusual ability and having been identified with telegraph interests for over a quarter of a century is well qualified to perform this interesting duty.

Mr. Andrew Carnegie has promised to be the final contributor to the fund.

Meeting of T. M. B. A.—The annual meeting of the Telegraphers' Mutual Benefit Association will be held at 4 p. m., November 15, at 195 Broadway, New York. An amendment to the constitution providing that past presidents shall be members of the executive committee will be voted upon and also an amendment making change in date of annual meeting.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL.

Mr. F. E. McKiernan of the New York office was a recent visitor.

The great telegraphic song hit, "SEND ME A NIGHT LETTER, DEARIE." Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.

B. L. BRANNAN,
195 B'way, N. Y.

Mr. P. C. Murphy, formerly stationed at the *Telegraph* office, is now at the switchboard, and Mr. Brandt of this office is looking after our interests at the *Telegraph*.

NEW YORK WESTERN UNION.

Mr. J. F. E. Hopkins, lately of the Eastern Board, has been appointed division loop chief in place of Mr. Willis H. Jones, who has been attached to the staff of Mr. W. E. Athearn, engineer of equipment.

Miss Jennette F. Powell has resumed duty after spending the Summer at Saratoga Springs, N. Y.

Mr. M. J. Olwell, formerly of this department, accidentally fell out of a window at his home in this city on October 5 and was instantly killed.

The annual entertainment of the New York Telegraphers' Aid Society for the benefit of the Relief Fund will take place on Tuesday evening, November 21, at the Lexington Ave. Opera House, Fifty-eighth Street near Third Avenue, Manhattan. Mr. James P. Clolery has been appointed chairman for this season and announces that the members of the various committees are making every effort to bring this year's event up to the standard and if possible surpass previous entertainments.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, enables telegraph and telephone employes to provide for their families life insurance in reasonable amounts, at a cost so low as to be within the reach of all. It has already paid beneficiaries of deceased members $1,500,000, at an average annual cost per $1,000 of about four cents a day, and has also accumulated $327,000 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.

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.

Martin's double or single lever **VIBROPLEX** $7.50. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

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Telegraph and Telephone Age

No. 21. NEW YORK, NOVEMBER 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Loops, Cords and Springjack Defects—A Hint to Linemen.

(*Continued from page 664, October 16.*)

Flexible cords which usually from the main line terminals of branch office loops probably cause more temporary interruptions to the service than any other part of the circuits, especially after they have been used some time. They should therefore be tested carefully and intelligently the moment intermittent trouble becomes noticeable.

Owing to the flimsy material with which the cord conductors are made, consisting as they do of fine copper tinsel twisted together, and the manner in which they are connected to the brass sides of the wedge, they cannot withstand rough usage very long without becoming a source of trouble. Furthermore, when a defect appears, other than a full break, it is at first so deceptive and elusive that the fault is hard to locate.

For illustration: A few broken strands may not actually break the electrical continuity, but they certainly do cause a high resistance at times, and frequently diminish the volume of current to such an extent that the sounders stand "open." A slight alteration of the position of the cord giving it a different angle usually bridges over small defects of this kind by pressing more strands into service. Even when every strand is broken, the ends sometimes overlap one another, and thus preserve partial continuity until the cord is again shifted or placed at another angle.

Again, with every strand intact, high resistance may result from insufficient pressure against the brass lips of the wedges. Imperfect contact of this kind results from stretching the strands by constant handling of the cords, and thus diminishing the diameter of the small wire rope they form, which is held against the brass by the tape and twine wrapped around the wedge. It will thus be seen that the source of a defect in a flexible cord may in nearly every case be found in or near the neck of the wedge where all the wear and tear occurs.

HOW TO TEST A CORD.

To determine whether intermittent openings are due to imperfections in the cord or the springjack in which it is inserted, first press the upper lip of the jack down firmly on the wedge, so that the latter cannot move, as you twist the cord near the neck so as to give it all possible angles. If the cord is defective at that point your test sounder, which you should insert, will disclose the fault by opening and closing. If the cord is not defective no opening will occur.

The next operation is to remove the hand pressure against the jack and move the wedge sideways in the jack. If openings then occur you should look for trouble in the springjack. If it is the receiving side that shows trouble, the defect will usually be found in a loosened nut behind the board which connects the wire to the under lip.

If it is on the sending side and is caused by a side twist of the wedge the fault probably lies in the hinge pin and can only be remedied by removing the jack and replacing it with a new and better fitting pin.

Sometimes a loop will open when the wedge is inserted too far. This fact usually leads the inexperienced to believe the springjack is defective. In the majority of cases, however, it will be found that the trouble is due to the wrapping twine being too thick near the base of the wedge. This fault is particularly noticeable in old wedges which have been carelessly rewrapped. When such is the case the opening is caused by the diminished pressure of the springjack lips on the brass sides of the wedge owing to their contact now being made principally at the base of the wedge. This base pressure acts as a lever and tends to separate the blades at the tip or at least lessen the contact pressure on the strands, hence high resistance or an apparent "opening."

There are really more openings on duplex loops due to this source than is suspected. In fact probably 50 per cent of the openings reported to the loop chief in one day may be attributed to defects of this nature. When such faults occur the loops may in nearly every case be closed by merely tapping the open side of the loop's wedge with a 70-volt battery. The extra voltage seems to bring a strain on the intertwined strands and causes a bet-

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ter contact to be made, and, strange to say, the contact is maintained for hours at a time after the regular voltage has been replaced, and sometimes the contact remains permanent.

Of course interruptions of this kind are not usually confined to one loop, but in a large loopswitch a great many are encountered every day. However, when the defect appears two or three times in the same loop, it is advisable to have the wedge rewound at once.

Linemen are too frequently sent on a blind chase because wedge terminals are not tested soon enough. In large offices there are men detailed to repair cords at almost a moment's notice, so there is no excuse in not promptly remedying these defects. In small towns where such help is not available, each manager should learn the way to repair cords properly and see that such work is not neglected. The operation has been accurately described in a back number of this journal, and if the reader does not know how to proceed, it is simply one of many other free lessons missed by those who do not subscribe for this paper.

Recent Telegraph and Telephone Patents.

ISSUED OCTOBER 3.

1,004,767. Combined Telegraph, Signal and Telephone System. To W. A. Froeckman, St. Louis, Mo.

1,004,995. Telephone Instrument. To P. B. Clarke, Liverpool, England.

ISSUED OCTOBER 10.

1,005,179. Guard for Telephone and Telegraph Wires. To C. J. Elliott, Oxnard, Cal.

1,005,194. Telephone System. To T. W. Gleeson, Boston, Mass., and W. H. Gilman, Medford, Mass.

1,005,393. Telephone System. To C. S. Winston and E. H. Rupe, Chicago, Ill.

1,005,714. Cable Duplex System. To I. Kitsee, Philadelphia, Pa.

1,005,715. Telegraphy. To I. Kitsee, Philadelphia, Pa.

Personal.

His Excellency Agap Effendi Stamboulian has been appointed Minister of posts, telegraphs and telephones of the Ottoman Empire.

Mr. E. H. Binford has been appointed superintendent of the Mountain Telegraph Company, with headquarters at Denver, Col., vice J. R. Waltz, deceased.

Mr. D. G. Ramsay, an old-time telegrapher and now a member of the bar at Chicago, is a candidate for election as judge of the superior court in that city.

Mr. Thomas A. Edison.—It is reported from Stockholm, Sweden, that Mr. Thomas A. Edison will be awarded a Nobel prize for his scientific achievements.

Mrs. Marconi.—Signora Marconi, wife of Signor Guglielmo Marconi, the inventor of wireless telegraphy, has been chosen as a lady-in-waiting to Queen Helena of Italy.

Mr. W. D. Weaver, editor of the *Electrical World*, New York, has been appointed a member of the Edison medal committee of the American Institute of Electrical Engineers.

Major George O. Squier, assistant chief signal officer, Washington, D. C., recently gave a lecture at the Franklin Institute, Philadelphia, on "Electrical Methods of Intercommunication for Military Purposes."

Mr. Frank A. Munsey, the well-known publisher, and an old-time telegrapher, has returned from Europe. He was a passenger on the steamer *Olympic* at the time she collided with the British cruiser *Hawke*.

Mr. Gano Dunn has returned from abroad, where, as a representative of the United States Government and as president of the American Institute of Electrical Engineers, he has been attending the International Electrical Congress at Turin and the meeting of the International Electrotechnical Commission.

Mr. Thomas A. Edison was entertained at luncheon on the occasion of the formal opening of the New York Electrical Show on October 11. He was presented with a cubic foot of copper by copper producers as expressing their appreciation for what his inventions have done for the copper industry. The copper cube weighs 486 pounds.

Mr. Ralph W. Pope, former secretary of the American Institute of Electrical Engineers, New York, and an old-time telegrapher, made an address at Great Barrington, Mass., on September 5, on the occasion of the one hundered and fiftieth anniversary of the incorporation of that town. Mr. Pope is a native of Great Barrington.

Capt. W. L. Candee.—The "Brooklyn Eagle" of Sunday, October 8, contained an interesting account of the work of Capt. Willard L. Candee in introducing the telephone in Brooklyn, N. Y., in 1877. The story is well written and includes a portrait of Capt. Candee, who is now president of the Okonite Company, New York.

Mr. George M. Eitemiller, one of the most expert and best known telegraphers in the United States, who has been located at Detroit, Mich., for several years past, has just recovered from a severe illness caused by a nervous collapse. Mr. Eitemiller has lost none of his old time vigor and his beautiful Morse is as clean cut today as thirty years ago.

Mr. J. F. Gormley.—The Canton "Journal," of Canton, Mass., recently printed a portrait and a brief biographical sketch of Mr. James F. Gormley, an old-time telegrapher and now a respected citizen of that place. Mr. Gormley is now seventy-five years of age and retired from active duty after a service of fifty years. He began his telegraphic career as a messenger boy in the early fifties.

Dr. Adolf Franke, director of the Siemens & Halske A. G., Berlin, Germany, who arrived at New York October 13 on a visit to the United States, will represent the "Verband Deutscher Electrotech-

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Ahead of the Game

The records show that all the necessities in Telephone Train Dispatching have been anticipated, developed and provided for by

The United States Electric Co.

and later have been copied or pirated by others.

New York **Chicago**

New Book on Telephony.

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

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niker" at the Helmholtz celebration, which has been arranged by the American Institute of Electrical Engineers. Dr. Franke is accompanied by Dr. A. Ebeling, chief of the Pupin department of Siemens & Halske Company, and well known among the profession for his researches on, and designs of, Pupin lines and Pupin cables. These gentlemen, accompanied by Dr. K. G. Frank, the American representative of the Siemens & Halske interests, New York, will visit a number of the more important telephone and telegraph installations in this country, and will study especially the effect of high tension transmission lines on telephone and telegraph lines and long distance telephonic and telegraphic transmission in general. Later these gentlemen will be joined by Dr. Paul Rasehorn, chief of the department for measuring instruments of the Siemens & Halske A. G.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, left New York on October 23 on an extended western trip.

Mr. C. P. Bruch, third vice-president, New York, has returned from a trip to Boston and Baltimore on company business.

Mr. L. Lemon, division superintendent, New York, has returned from Buffalo, N. Y., where he went to fill the duties of Mr. H. D. Reynolds, district superintendent at that point during the latter's absence of two weeks.

Mr. Harvey D. Reynolds, district superintendent, Buffalo, N. Y., was a recent executive office visitor.

Mr. Frank G. McGinnis has been appointed cashier of this company at Boston, Mass., vice J. H. Wentworth, deceased. Mr. McGinnis has been in the service about ten years and was appointed assistant cashier for six years.

Mr. Jos. E. Fenn., who has for seven years been in charge of the repeater service for the Postal Telegraph-Cable Company at La Junta, Col., has resigned. It is not stated what plans he has made for the future.

The Jacksonville, Fla., office of this company is to be remodeled and enlarged during the coming winter, and the overhead wires on Bay Street are to be placed underground. Mr. George W. Ribble, district superintendent, Atlanta, Ga., is looking after the details of the work. A new line will also be constructed to De Land and an office opened there.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Newcomb Carlton, vice-president; Mr. Belvidere Brooks, general manager, together with general superintendents Mr. A. G. Saylor of New York, Mr. T. P. Cook of Chicago, Mr. H. C. Worthen of Atlanta, Ga., Mr. L. McKissick of Dallas, Tex., Mr. J. C. Nelson of Denver, Col., and Mr. C. H. Gaunt of San Francisco, Cal., met in conference in New York October 16-20 to discuss matters pertaining to company business throughout the country. On the evening of October 18 President Theo. N. Vail and vice-president Newcomb Carlton entertained the general superintendents at dinner at the New York Yacht Club.

Mr. T. W. Carroll, assistant to the general manager, has returned from a business trip throughout the South.

Mr. E. Parsons, district plant superintendent at Indianapolis, Ind., has been transferred to Cleveland, Ohio, to occupy a similar position in that city.

Mr. H. A. Carrell, manager at Macon, Ga., has been appointed city solicitor for this company at Jacksonville, Fla.

Mr. H. D. Spencer has been appointed chief clerk to district traffic superintendent R. W. Kean at Minneapolis, Minn., vice W. G. Pownall, resigned to accept a position as train dispatcher at Bogalusa, La.

The following appointments have been made in the Southern Division by superintendent J. S. Calvert of Richmond, Va,; Mr. Geo. W. Gyles, manager at Bennettsville, S. C., vice Geo. A. Haralson, who leaves the service; Miss Henrietta Hoffman, manager at Marion, Va., vice Von M. Summers; Mr. Von M. Summers, manager at Harrisonburg, Va., vice Miss Ella N. Vollrath, resigned; Miss L. W. Bowden, manager at Rutherfordton, N. C., vice J. H. Carpenter; Mr. J. H. Carpenter, manager at Clinton, N. C., vice H. S. Matthews, who leaves the service; Mr. W. S. Green, formerly operator at the Portsmouth, Va., office, manager, vice Miss C. B. Beall.

At the meeting of the stockholders of this company on October 11 the following directors were elected: Oliver Ames, John Jacob Astor, Union N. Bethell, Henry A. Bishop, Robert C. Clowry, Henry P. Davison, Chauncey M. Depew, Harris C. Fahnestock, Henry M. Flagler, Robert M. Gallaway, Edwin Gould, George J. Gould, Edward J. Hall, Henry S. Howe, Thomas H. Hubbard, Edward T. Jeffery, Charles Lanier, Robert S. Lovett, John J. Mitchell, William H. Moore, J. Pierpont Morgan, Jacob H. Schiff, Joseph J. Slocum, James Stillman, Harry B. Thayer, Theo. N. Vail, Henry Walters, John I. Waterbury, J. C. Willever, Robert Winsor.

At the meeting of the directors on October 18 the executive committee and officers were elected as follows: Executive committee—E. J. Hall, chairman, U. N. Bethell, H. A. Bishop, R. C. Clowry, H. C. Fahnestock, T. H. Hubbard, Jacob H. Schiff, J. J. Slocum, Theo. N. Vail. Officers—President, Mr. Theo. N. Vail; vice-presidents, Messrs. Newcomb Carlton, J. B. Van Every, Thomas F. Clark and G. W. E. Atkins; treasurer, Mr. A. R. Brewer; acting secretary, F. W. Lienau; auditor, E. Y. Gallaher. Over 780,000 shares were represented at the annual meeting.

A conference of traffic superintendents and traffic chiefs of the large offices in the first, third, fourth

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and fifth districts of the Eastern Division was held at 195 Broadway, New York, on October 24 and 25, and general traffic matters were discussed. Among those present, besides J. A. Hill, division traffic superintendent, New York, were: Herbert Smith, district traffic superintendent, New York; Richard O'Brien, district traffic supervisor, Scranton, Pa.; T. J. Meade, district traffic supervisor, Albany, N. Y.; T. H. O'Mara, general traffic chief, Buffalo, N. Y.; J. M. Lighton, general traffic chief, Syracuse, N. Y.; C. Bauer, general traffic chief, Albany, N. Y.; W. J. Dodge, district traffic superintendent, and J. A. Larimore, general traffic chief, Pittsburg, Pa.; J. M. Creamer, district traffic superintendent, Philadelphia; F. R. Webb, E. A. Anderson and J. W. Collins, general traffic chiefs at Philadelphia, Baltimore and Washington, respectively; L. D. Wilbourn, district traffic superintendent, and J. B. Rex, general traffic chief, Boston, Mass.; T. A. McCammon, traffic superintendent; E. T. Burrill, general traffic chief; J. Morison, assistant general traffic chief; T. Brennan, chief clerk, and C. C. Lever, general wire chief of the general operating department, New York; W. A. McAllister, traffic superintendent, and P. J. Tierney, cable supervisor, cable office, New York; F. D. Giles of the general superintendent's office and H. K. Griffin, eastern division traffic supervisor, New York.

A dinner was given on the evening of October 21 by the plant and traffic employes of the New Orleans office and was well attended. Speeches were made by Mr. W. A. Porteous, manager; Mr. T. P. Cummings, district superintendent; Mr. H. Vandevender, commercial superintendent, and others. The most of the evening was occupied by a chalk-talk lecture on electrical units and co-related subjects by Mr. Louis Casper, superintendent of equipment, after which steps were taken for the formation of an electrical club for the purpose of taking up the study of telegraph and telephone engineering.

The headquarters of this company at Jacksonville, Fla., are undergoing a general renovation and many improvements are being added. The official staff at this point consists of L. J. Maxwell, district superintendent; C. M. Holmes, manager; R. L. Branton, chief operator; J. A. Suder, night chief operator; C. A. Nichols, all night chief operator; E. L. Williams, supervisor of traffic; S. A. Young, supervisor of traffic; S. L. Burts, commercial superintendent. The company employs one hundred and fifty clerks and operators in the summer, and from one hundred and seventy-five to two hundred in the winter season in the Jacksonville office.

Mr. W. H. Mann, manager of the Western Union office at Phoenix, Ariz., believes in familiarizing his force with the apparatus the telegrapher is called upon to handle in the discharge of his duties. He is placing books and trade paper literature at the disposal of the employes of the office.

The Telephone.

Mr. J. E. Farnsworth, vice-president of the Southwestern Telegraph and Telephone Company, Dallas, Tex., was a recent New York visitor.

Mr. F. H. Bethell, of the New York Telephone Company, addressed the Telephone Society of New York on the subject of "Conservation and the Wire Service," at the meeting of October 24.

Miss Kathleen Lyon, the telephone operator at Austin, Pa., who gave the warning by telephone of the approaching flood when the dam burst at that place recently, has been rewarded by the telephone company for her heroism. She received $100 in cash and a gold watch.

Mr. Alfred E. Holcomb, assistant secretary of the American Telephone and Telegraph Company, New York, is the author of a paper entitled "The Assessment of Public Service Corporations," read at the fifth annual conference held at Richmond, Va., September 5-8, under the auspices of the International Tax Association. It is a very exhaustive discussion of the subject.

Telephony in Russia.—A government bill has been introduced to authorize the complete reorganization of the Russian telephone service under the control of the state.

Telephone Rates in Birmingham, Ala.—The petition of the Southern Bell Telephone and Telegraph Company to the Alabama Railroad Commission for permission to increase its rates in the city of Birmingham was dismissed for the want of jurisdiction.

Telephones for Forest Fire Alarms.—The telephone system in the Mount Tacoma, Wash., national reserve consists of fourteen miles of telephone communication. This line was constructed by the Federal government and is a part of a system which later will be much more comprehensive. All of it is located so as easily to connect with rural telephones and thence indirectly with the Tacoma central office.

Independents Absorbed by Bell Telephone Company.—The Auburn (N. Y.) Telephone Company, together with the Skaneateles and allied telephone companies in Onondaga and Cayuga counties, have been sold to the Bell interests through the Friendship Telephone Company. These companies have hitherto been independent and were among the larger components of the system of the Federal Telephone Company.

Telephone Society in Buffalo.—Officers and employes of the western division of the New York Telephone Company, Buffalo, N. Y., have perfected the organization of a telephone society, which has for its object the study of matters pertaining to the telephone business. The local organization is affiliated with the Telephone Society of New York and will be known as the Western Section of the Telephone Society of New York. It will draw its membership from employes of the New York Telephone Company, the American Telephone and Telegraph Company, the Western Electric Company and the

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Western Union Telegraph Company and their allied interests in Western New York. Meetings will be held once a month. The officers of the society are: Chairman, C. A. Spaulding; vice-chairman, J. L. Parker; secretary-treasurer, Harrison Stewart; executive committee, W. J. Hiss and F. C. Waite.

Telephone Extension in Austria.—The extension of the telephone system in Vienna and throughout Lower Austria is being actively prosecuted. The whole area of the capital city is being equipped with telephone lines and exchanges at suitable intervals, and the work will extend well into next year. Besides the main scheme, a series of block systems will be installed. Outside Vienna and throughout the length and breadth of Lower Austria, the improvement of existing installations and erection of new ones is in full swing.

New York City Telephone Directories.—The compiling of the New York City telephone directories by the New York Telephone Company is done by a department which is devoted exclusively to this work all the year round. The printing and binding is done by one of the largest printing houses in the world, which keeps about 350 skilled workmen busy for eight months in the year. It costs the company $40,000 a year to deliver the directories, and when a new directory is issued all the old ones are collected and ground to pulp at a large paper mill.

Entertainment By Telephone.

The New Jersey Telephone Herald Company, Newark, N. J., on October 24 inaugurated its service for the distribution of news bulletins, music, theatricals, sermons, etc., by telephone, also the correct time. The announcements are made by "Stentors" into special microphones, and there is a fixed hour during the day for every class of news. Under this system a subscriber can hear any of the prescribed forms of entertainment and instruction at stated hours of the day or night without leaving his home.

Radio-Telegraphy.

Mr. Jack Irwin, who won fame as the wireless operator on the Wellman transatlantic airship expedition, will occupy a similar position on the Sieberling-Vaniman dirigible balloon, with which an attempt is to be made to cross the Atlantic.

Navy Wireless Exhibit in New York.—The electrical school at the Brooklyn Navy Yard had an interesting exhibit at the Electrical Exposition in New York October 11-21. The display consisted of wireless telegraph apparatus demonstrating the methods of instructing the navy operators. There was also a panel board working in conjunction with a set of signal lights such as are used on battleships which are used to flash signals between the vessels of a fleet at night.

To Reorganize United Wireless Company.—Stockholders of the United Wireless Telegraph Company have organized a protective committee and will try to formulate a reorganization plan by which the company may be taken out of the hands of the Federal receiver. The committee is composed of G. W. Gray, chairman; John W. Jones, secretary; Orlando P. Dorman, Leroy H. Byam, Dudley McAdow, James Baker and Isaac P. Williams. Stockholders in favor of the movement are requested to send in their proxies to the committee at No. 1 Wall Street, New York.

Cross-Country and Coast Wireless.—The operator at the New York "Herald's" wireless station at the Battery, New York, recently was in direct wireless communication with Sault Ste. Marie, Mich., 825 miles away, also with the battleship "North Carolina" at the Portsmouth, N. H., Navy Yard, 350 miles distant.

The wireless operators at the naval torpedo station at Newport, R. I., recently talked with the naval wireless operator at Key West, a distance of 1,100 miles. Messages from Colon were also distinctly heard at Newport, the distance being over 2,000 miles. New apparatus was used at Newport.

The Cable.

The Tripoli Cable.—Cable communication between Malta and Tripoli has been restored.

Cable Repaired.—The cable steamer "Relay" belonging to the Mexican Telegraph Company effected repairs to the French cable off St. Pierre, Miquelon, during the middle of October.

Argentine Trade Conference.—The first Argentine Trade Conference in the City of New York was held in that city on October 10. Mr. B. H. Reynolds, superintendent of the Central and South American Telegraph Company, made an interesting address on his company's extensive system of communication between the United States and the Argentine Republic, which has been so great a factor in improving the trade relations between the two countries.

The Associated Press.

Col. J. R. Caldwell, representative of the Associated Press in Cuba, has returned to his post in Havana after a visit to the United States.

Mr. Arthur W. Copp has been appointed superintendent of the Western Division of the Associated Press, with headquarters at Chicago, vice Mr. W. E. Kloeber. Mr. Copp was the Denver correspondent of the Associated Press, and is succeeded at that point by Mr. C. C. Hagerty of the Chicago office.

Obituary.

James R. Waltz, superintendent of the Mountain Telegraph Company, Denver, Col., died recently at the age of 35 years.

George A. Deal, aged 37 years, formerly manager of various Postal offices in New England cities, and latterly manager of the Providence, R. I., office of Henry Clews & Co., the New York bankers, died in Providence on October 23.

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Meeting of The Telephone Pioneers in Boston.

Following is the official programme for the meeting of the Telephone Pioneers of America to be held at the Hotel Somerset, Boston, Mass., November 2 and 3:

Thursday, November 2.

Morning—Meeting 10 a. m. Organization.

Afternoon—Addresses by Dr. Alexander Graham Bell, Thomas D. Lockwood, and others.

Evening—Theatre.

Friday, November 3.

Morning—Visiting Main Telephone Exchange.

Afternoon—Automobile ride, taking in Concord, Lexington and suburbs of Boston.

Evening—Formal Banquet.

A banquet for ladies only will be served in a special hall and music and entertainment will be provided for them.

The organization committee of the Telephone Pioneers of America has issued a neat booklet containing a list of members. It shows a total of 439 pioneers and is bound in a Bell telephone blue cover, the title being embossed in gold. Twenty-three of the pioneers represent the Southern New England Telephone Company. The committee consists of Messrs. Henry W. Pope, Charles R. Truex and Thomas B. Doolittle, 26 Cortlandt Street, New York.

Over 200 acceptances for the banquet have been received, and these do not include the ladies who will be taken care of independently. The invitations will be handsomely engraved and the names of the pioneers engrossed thereon.

Among the prominent telephone men who expect to be present will be Mr. Frederick P. Fish, former president of the American Telephone and Telegraph Company.

There will be some interesting exhibits. Mr. E. T. Holmes, who is one of the earliest of the pioneers, will show the first telephone switchboard ever used, and the Western Electric Company is getting out a beautiful souvenir of the original telephone as shown in the Bell patents.

Mr. Angus S. Hibbard, of the personal staff of Mr. Theo. N. Vail, has charge of the banquet arrangements and is preparing a programme that will be highly interesting and enjoyable.

Members of the Reception Committee will meet the delegates on their arrival at the various stations.

The automobile procession on Friday, November 3, will, it is stated, be one mile long. Each automobile will carry four pennants showing the seal of the society. As the delegates pass into the automobiles they will be presented with a booklet by representatives of the New England Telephone and Telegraph Company, giving historical information regarding Boston and the surrounding country.

During the banquet on Friday evening portraits of prominent pioneers will be projected upon the screen.

The Western Electric Company has drawn up the plan for the arrangement of the banquet hall. It shows thirty tables, at each of which six persons will be seated. Each person will find a souvenir at his seat. At the front of the room will be a raised platform, at which the prominent members of the association will be seated. This has been termed the "P. B. X."—private branch exchange—and at each table one person will be designated to act as "supervisor."

Financial.

According to the report of president Theo. N. Vail of the Western Union Telegraph Company for the year ended June 30, $80,000 in Mutual Union Telegraph Company 6% bonds were exchanged during the year for a corresponding amount of Western Union 5% collateral trust bonds, which largely accounts for the increase in outstanding collateral trust bonds and the reduction in the outstanding bonds of subsidiary companies. The outstanding holdings of 6% Mutual Union bonds maturing in 1911 were, on June 30, $1,877,000. These bonds were renewed for 30 years at 5%.

The company borrowed $2,000,000 on temporary loan during the year.

On June 30, 1910, the accountants set up a reserve of $2,000,000 against the American Telegraph & Cable Company cables leased by the Western Union Company until 1932, in order that there might be a fund to guarantee their maintenance during the continuance of the contract. There has been the extraordinary expenditure of approximately $800,000 in the course of the year for the renewal of the English shore ends, and there has been added to the fund, by means of monthly charges to operating account, the sum of $135,000, showing a net decrease in fund at the close of the year of $665,000.

To Absorb Western Telephone and Telegraph Company.—The American Telephone and Telegraph Company has announced its intention of absorbing the Western Telephone and Telegraph Company. The deal will be arranged through the purchase of the minority portions of the $16,000,000 preferred and $16,000,000 common stocks. For each four shares of Western Telephone preferred stock will be given three shares of American Telephone and $20 in cash. For each five shares of Western Telephone common will be given one share of American Telephone.

Telegraph and Telephone Stock Quotations.

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

Western Union Tel. Co.	77¼
Mackay Companies	86½
" " pfd.	72½
Amer. Telep. and Teleg. Co.	134¼

The Telephone and Telegraph in Tripoli.—Tripoli, which is the centre of the war between Italy and Turkey, has only seven telephone stations. The system is operated by the military department. The country has 3,150 miles of telegraph.

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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's "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 unfold the answers. This method of acquiring technical knowledge is a fascinating one.]

CHAPTER IX (*Continued*).

How is the condenser adjusted so that its discharge will equal that of the line?

When the balance is attained how is the fact indicated on the instruments?

If the home polar relay responds to each motion of the home pole changer, is the static balance considered good?

What other method is there to obtain a static balance?

What is the objection to this latter method of balancing?

What is the effect on the operation of the polar side of a displacement of the armature of the polar relay from the "centre"?

Review the third method of adjusting the condenser to the line discharge.

In adjusting for static, why is it advisable to apply the full battery to the line?

Does the whole battery to the line cause a greater or less static discharge than would a half or a third of the battery?

Explain why the static discharge varies with the strength of the current.

What test is made to ascertain whether the static balance at both ends of the circuit is correct?

If B's writing comes clearly under all varying conditions at the A office, what does it indicate?

If the contact points of the distant pole changer should be rough or otherwise defective, what would be the effect at the home station?

How may the contact points of a pole changer be put in proper order?

If cleaning the points of the pole changer does not remove the breaking-up of signals, what is the next step to be taken?

If B's writing comes light on both sides or if B complains that A's writing comes light, what should be done?

If, while B is dotting on his pole changer A is unable to read his signals on the No. 2 side, what directions should be given to B to determine the source of the trouble?

What would be the effect on the operation of the instruments of a defect between the "tap" of B's battery and the post of his transmitter?

What are the possible causes of such a defect?

Suppose the static balance at the A end of the line is not good, what will be the effect?

If varying the capacity of the condenser has no effect on the static discharge what is the probable cause of the trouble?

If another wire is crossed with a quadruplexed wire and is "openod" in order to clear the latter, what is the effect on the static capacity?

It is sometimes necessary to add another condenser to a circuit. Under what circumstances and why is it done?

Does a change in the weather conditions affect the balance of a wire?

A Good Guide.

A Cornell graduate, an electrical engineer, was killed in an accident while following his profession. Among his papers, after his death, was found this statement of what he had set himself to be and do in life. It was headed "My Guide" and it ran thus:

"To respect my country, my profession and myself. To be honest and fair with my fellow-men, as I expect them to be honest and square with me. To be a loyal citizen of the United States of America.

"To remember that success lies within myself, in my own brains, my own ambition, my own courage and determination. To expect difficulties and force my way through them. To turn hard experience into capital for future struggles.

"To believe in my proposition heart and soul. To carry an air of optimism in the presence of those I meet. To dispel ill temper with cheerfulness, kill doubts with a strong conviction and reduce active friction by an agreeable personality.

"To make a study of my business. To know my profession in every detail. To mix brains with my efforts and use system and method in my work. To find time to do every needful thing by never letting time find me doing nothing. To make every hour bring me dividends in increased knowledge.

"To keep by future unmortgaged with debts. To save as well as to earn. To avoid expensive amusements until I can afford them. To steer clear of dissipation, and guard my health of body and peace of mind as a most precious stock in trade.

"Finally, to take a good grip on the joys of life and to play the game like a man. To fight against nothing so hard as against my own weaknesses, and to endeavor to grow in strength as a gentleman."—*Savings Journal.*

Novel Poles.—Tests are to be made at Tucson, Arizona, with a view to utilizing Sahuara (a giant cactus) for telegraph and telephone poles. The government will build a telephone line for the forestry service of the Coronado forest reserve and will fasten the brackets and insulators to the cacti.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - - - *Publisher*
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
R. J. WEEKS, Manager Advertising Department.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

November 1, 1911.

The Telephone Pioneers.

TELEGRAPH AND TELEPHONE AGE extends its heartiest greetings on the birth of the Association of the Telephone Pioneers of America, and wishes the new organization a long and useful career.

While it is founded largely on the idea of sentiment and sociability, it will no doubt incidentally serve a more utilitarian purpose. By meeting together at regular periods there will naturally be an exchange of ideas among the members, which will be of mutual benefit and ultimately be reflected in the betterment of the service if such a thing is possible.

It is only thirty-five years since the telephone was brought to public notice through the Centennial Exposition, yet in those years a wonderful development in the instrument and its application has taken place. When the telephone was born, it, like many other great inventions, was met with cold public favor, and it had a hard struggle to maintain its existence. But through the persistence and wisdom of its sponsors it won the battle and today the telephone industry stands as a monument to supreme engineering skill and business management, equalled nowhere in the world.

Most of the pioneers are yet young men, and if we can measure their future achievements by what they have done in the past thirty-five years, many wonderful things are awaiting their magic touch to be revealed to the world.

Interesting Facts in the Western Union Report.

It is highly encouraging to note in the annual report of president Theo. N. Vail of the Western Union Telegraph Company that there was an increase in the total revenue of the company of over three million dollars, or 9.57 per cent., notwithstanding the unsettled condition of general business. Under favorable conditions the revenue will, at this rate, make a splendid showing.

The increase of revenue, however, was more than offset by the increase in expenses, which amounted to $3,167,853, or 13.14 per cent. Over two-thirds of this additional expense represents increases in salaries, the actual amount applied to this purpose being $2,369,434 or 21.18 per cent. over last year. This is indeed substantial evidence that the company is standing by its faithful employes even at the cost of dividends to the stockholders. It seems to be the policy of the present managers to take care of the employes first and the latter are to be congratulated on their good fortune. As we have pointed out in previous issues the satisfied employe is the most valuable asset the company can possess, and the more valuable he is to the company the more valuable he is to himself.

The Evil of Oppression.

The average man likes authority, but all do not exercise it in the same manner. There is nothing so detestable as that form of authority known as oppression; and on the other hand it is a grand thing to use it in uplifting those who chance to be less fortunate.

It is indeed a sad sight to see one man in authority oppress those beneath him and treat them as though they were not worthy of any consideration, whereas the oppressor himself may have been one of the latter class before his advancement. Such a practice indicates a narrow mind, egotism and supreme selfishness. A man of this calibre is generally despised, except possibly by those who benefit by his favoritism.

Now take the man who exercises his authority for the good of his fellow men. He lays selfishness aside, encourages those beneath him to do better and generally is considerate of their welfare. He does not allow any personal animosities to bias his judgment of men. He remembers that he himself once was on a lower plane and looked up to those above him for inspiration, encouragement and guidance. Why, then, should he not practice these virtues when he advances to a position where he can exercise them.

We think it would be a good rule for telegraph and telephone companies when making appointments to positions of authority to give the appointee instructions as to his duties toward his subordinates as well as to his company and to himself. This could be done without any reflection upon a man's education in ethics, and certainly would be promotive of harmony and good feeling in the service.

The man who exercises his authority beneficently is universally loved and is the one most favored when honors are being distributed, but he who uses it otherwise is generally forgotten, if he does not pass into oblivion.

"Man's inhumanity to man makes countless thousands mourn" is the poet's way of expressing the same idea that impelled us to make these observations.

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What the world needs today is more justice and humanity, and he who practices them in his life work is a benefactor of mankind.

The Telephone in Our Lives.

That the universal use of the telephone is effecting marked changes in our methods of living and transacting our affairs is well known, but in these days of rush and bustle few people think long enough to realize how extensive its ramifications are in our lives. As soon as a child is born the telephone enters its life; relatives and friends are telephoned to concerning the event and the wires are kept warm for a time. It has been calculated that a birth in small Western towns means on an average over three hundred additional telephone calls. If the child catches the measles or is otherwise ill the doctor is telephoned for and frequently prescriptions are given by wire.

The telephone comes into play again during the school period, and when manhood and womanhood are attained it is used for courting, proposing and even marrying.

In Washington the other day a couple decided to marry on short notice and the wedding invitations were issued by telephone — the ordinary means of communication being too slow.

The immense value of the telephone in business transactions need not be referred to in detail. Fortunes are made and lost and important deals are arranged and closed without even having to move out of our chair. We can stay at home and transact our business by telephone and there is no end of things that the telephone cannot do for us. Finally when we die the undertaker is telephoned for and condolences pour in over possibly the same wire that carried congratulations at the birth of the deceased. And so it goes; telephone, telephone, telephone, from first to last.

Cruelty to Messengers.

One of the most outrageous acts ever perpetrated by a grasping monopoly is the limitations placed upon pocket space in the new uniforms of the messengers of one of the telegraph companies. The company defends its action on the flimsy ground that bulging pockets in a messenger's uniform are untidy. But it is suspected that this is only a pretext for cutting down expenses, and the poor messenger is the victim of this latest form of greed. How are the boys to carry their revolvers, jack knives and dime novels if they have no pockets? This is "the unkindest cut of all" and is enough to rob the victim of every spark of ambition to become a detective.

Mr. E. E. Williams, district superintendent of the Western Union Telegraph Company of Atlanta, Ga., in renewing his subscription for another year, writes: "TELEGRAPH AND TELEPHONE AGE is increasing in value with every issue, and I do not see how anyone engaged in either branch of the service can afford to miss it. I am doing all I can to impress this idea throughout my district."

Increasing the Membership of the T. M. B. A.

To the Editor of TELEGRAPH AND TELEPHONE AGE:

SIR:—Since the Telegraphers' Mutual Benefit Association has opened its doors to admit telephone employes to membership, permit me to say a few words on the subject.

That the idea and purpose is an excellent one goes without saying, and it should receive the hearty and active support of every member. The association depends for its existence upon the constant accretion in membership, and, as it is a purely fraternal organization, the responsibility for its growth rests entirely upon the active interest taken in its affairs by the members.

Each member should give the association a little of his time at regular intervals. By pointing out its advantages to his associates now and then, and following up the prospects, will not take more than a few minutes' time, and will in the end bring in many new members. Immediate results cannot of course be looked for, but by taking the matter in hand in a systematic manner the effects will be surprising.

Telephone employes are numerous, and this field is a splendid one for action on the part of members. If each member brings in one new member a year the association's prosperity will continue.

Every effort should therefore be made by the members to get the telephone employes interested in the good work of the Association. It is a very worthy institution and has accomplished a great deal in the past. Its future success depends largely upon the co-operation of the members with the officials, and a few minutes' time now and then in this direction will bring forth fruit in abundance. Let us all join hands in the cause.

"A TELEPHONE MEMBER."

A. I. E. E. Los Angeles Section.—The Los Angeles, Cal., Section of the American Institute of Electrical Engineers opened the season of 1911-1912 with an informal dinner on October 17. The principal speaker of the evening was Dr. Jas A. B. Scherer, president of Throop Polytechnic Institute. Pasadena, Cal., whose subject was "Technical Education from the Practical Standpoint." Among the associates elected at this meeting was Mr. L. C. McIntosh, of Los Angeles, a well known member of the telegraph fraternity.

New York Electrical Society.—Major George O. Squier, of the United States Signal Corps, Washington, D. C., gave a lecture before the New York Electrical Society on October 27 on the subject of "Electric Waves Directed by Wires for Intercommunicating Purposes." The lecture dealt with the latest ideas and advances in the solution of the problems connected with this modern branch of electrical development.

Chinese Telegraph Restrictions.—The Chinese Government has placed severe restrictions on the telegraph lines, evidently for the purpose of preventing communication between the rebel leaders.

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

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(Continued from page 678, October 16.)

We began in our issue for October 16 the publication of a course of instruction in technical telegraphy, which was prepared as a correspondence school course by Mr. J. H. Penman, of Rockport, Mass., an electrical engineer of ability and high standing.

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 will be 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 first lesson (October 16) covered a general description of fractions, and instruction and rules for the addition of fractions. In this issue we take up the same subject beginning with the subtraction of fractions. The mathematical section will carry the student through fractions, decimals, proportion, elementary algebra, etc.

SUBTRACTION OF FRACTIONS.

To subtract fractions:

RULE (6). *Reduce the fractions to fractions having a common denominator. Subtract the lesser numerator from the greater and place the remainder over the common denominator.*

Example: Subtract $\frac{1}{6}$ from $\frac{2}{3}$.

The least common denominator is 6.

$$\tfrac{2}{3}=\tfrac{4}{6};\quad \tfrac{4}{6}-\tfrac{1}{6}=\tfrac{3}{6}=\tfrac{1}{2}\quad \text{Ans.}$$

RULE (7). *When there are mixed numbers subtract the fractions and whole numbers separately and place the remainders side by side.*

Example: Subtract $9\frac{15}{32}$ from $17\frac{9}{16}$

The least common denominator of the fractions is 32;

$$\tfrac{9}{16}=\tfrac{18}{32};\ \tfrac{18}{32}-\tfrac{15}{32}=\tfrac{3}{32}.$$

Now take the whole numbers:

$$17 - 9 = 8.$$

Placing the remainders side by side: $8\frac{3}{32}$ Ans.

RULE (8). *When the fraction in the subtrahend is greater than the fraction in the minuend, borrow 1 from the whole number in the minuend and add it to the fraction in the minuend, from which subtract the fraction in the subtrahend.*

Example: Subtract $8\frac{7}{16}$ from $9\frac{1}{4}$.

The common denominator is 16.

Minuend $9\frac{4}{16}$
Subtrahend $8\frac{7}{16}$

We cannot take $\frac{7}{16}$ from $\frac{4}{16}$ so we borrow 1 from 9 and add it to the fraction, making $\frac{16}{16}+\frac{4}{16}=\frac{20}{16}$; $\frac{20}{16}-\frac{7}{16}=\frac{13}{16}$. The whole number in the minuend being now the same as that in the subtrahend, the difference is $\frac{13}{16}$. Ans.

RULE (9). *When the minuend is a whole number borrow 1; reduce it to a fraction whose denominator is the same as the denominator of the fraction in the subtrahend, and place it over that fraction for subtraction.*

Example: Subtract $8\frac{3}{16}$ from 9.
$9=8\frac{16}{16}$.

Minuend $8\frac{16}{16}$
Subtrahend $8\frac{3}{16}$

$\frac{13}{16}$ Ans.

MULTIPLICATION OF FRACTIONS.

To multiply proper fractions:

RULE (10). *Multiply the numerators for the new numerator, and the denominators for the new denominator. All factors common to the numerators and denominators should first be cancelled.*

Example: Find the product of $\frac{3}{5} \times \frac{7}{10}$

Solution: There being no factors common to the numerators or denominators, we proceed to multiply:

$$\frac{3 \times 7 = 21}{5 \times 10 = 50} = \tfrac{21}{50}\ \text{Ans.}$$

Example 2: Find the product of $\frac{21}{32} \times \frac{6}{14}$.

Solution: Cancelling the common factor 7, we get

$$\tfrac{21}{32} \times \tfrac{6}{14} = \tfrac{3}{32} \times \tfrac{6}{2}$$

Multiplying the numerators and denominators:

$\frac{18}{64}$ Ans.

To multiply improper fractions:

RULE (11). *Divide the product of the numerators by the product of the denominators.*

Example: Find the product of $\frac{12}{7} \times \frac{7}{8}$.

Multiplying, we get $\frac{84}{56}$

Dividing the numerator by the denominator:

$1\frac{28}{56}$ Ans.

To multiply one mixed number by another:

RULE (12). *Reduce the mixed numbers to improper fractions and apply Rule 11.*

Example: Find the product of $2\frac{1}{3} \times 3\frac{1}{4}$.

Solution: Reducing to improper fractions: $\frac{7}{3} \times \frac{13}{4}$

There are no common factors so we multiply:

$$\frac{7 \times 13 = 91}{3 \times 4 = 12} = 7\tfrac{7}{12}\quad \text{Ans.}$$

To multiply a mixed number by a whole number:

RULE (13). *Consider the whole number as a fraction with 1 as its denominator, and apply Rules 11 and 12.*

Example: Find he product of $17\frac{18}{21} \times 7$.

Applying Rules 11 and 12 and cancelling:

$$\tfrac{375}{21} \times \tfrac{7}{1} = \tfrac{125}{1} = 125.\quad \text{Ans.}$$

DIVISION OF FRACTIONS.

To divide fractions:

RULE (14). *Invert the divisor and proceed as in multiplication.*

Example: Divide $\frac{4}{5}$ by $\frac{2}{3}$.

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Inverting the divisor: $\frac{3}{5} \div \frac{3}{2}$
Changing to multiplication:
$\frac{5}{5} \times \frac{2}{3} = \frac{9}{15}$. Ans.

Example: Divide $\frac{9}{16}$ by $\frac{5}{18}$.
Inverting the divisor: $\frac{9}{16} \div \frac{18}{5}$
Changing to multiplication and cancelling,

$$\frac{\overset{3}{9}}{\underset{1}{16}} \times \frac{\overset{1}{18}}{\underset{1}{5}} = \frac{3}{1} = 3. \quad \text{Ans.}$$

Example: Divide 5 by $\frac{9}{16}$.
Inverting the divisor, $5 \div \frac{16}{9}$
Changing to multiplication:

$$\frac{\overset{1}{5}}{\underset{1}{1}} \times \frac{\overset{8}{16}}{\underset{1}{9}} = \frac{8}{1} = 8 \quad \text{Ans.}$$

Example: Divide $7\frac{7}{16}$ by $3\frac{3}{4}$.
Reducing to improper fractions:
$7\frac{7}{16} = \frac{119}{16}$, $3\frac{3}{4} = \frac{15}{4}$.
Inverting the divisor: $\frac{119}{16} \div \frac{4}{15}$
Changing to multiplication and cancelling:

$$\frac{119}{\underset{4}{16}} \times \frac{\overset{1}{15}}{\underset{1}{4}} = \frac{119}{80} = 1\frac{39}{80}. \quad \text{Ans.}$$

DECIMALS.

A *Decimal Fraction* is a fraction whose denominator is some power of ten.

The powers of ten are 10, 100, 1,000, etc.

Decimal fractions may be expressed in three ways:

1. By words; as, three-tenths, twelve-hundredths.
2. By writing the denominator under the numerator, in the form of a common fraction; as, $\frac{3}{10}$, $\frac{12}{100}$.
3. By omitting the denominator and writing the fraction in a decimal form; as, .3, .12. The term decimal is usually applied to decimal fractions when expressed by the third method.

The *Decimal Point* is a period placed at the left of tenths, to designate the decimal orders.

A *Mixed Number* is a whole number, or integer, and a decimal written together as one number. The orders on the left of the decimal point are ***integral***, and those on the right are ***decimal***. The decimal orders are called *Decimal Places*.

The following table gives the names of a few integral and decimal orders, and shows the relation between them:

Integral Orders								Decimal point	Decimal Orders							
Hundred-millions	Ten-millions	Millions	Hundred-thousands	Ten-thousands	Thousands	Hundreds	Tens	Units	Tenths	Hundredths	Thousandths	Ten-thousandths	Hundred-thousandths	Millionths	Ten-millionths	Hundred-millionths

Any book on electrical subjects can be obtained at the office of Telegraph and Telephone Age, 253 Broadway, New York.

The Turin International 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. There were 226 competitors, of which 114 represented the Italian administration and 112 foreign administrations, nine of them being women. The countries represented were Germany, Austria, Belgium, Brazil, Spain, France, Great Britain, Greece, Hungary, Roumania, Servia, Sweden, Switzerland, Turkey and the South African Union, no one being present from the United States.

On August 18 the International jury held a meeting which was presided over by Mr. Giuseppe Greborio, inspector general of Italian posts and telegraphs, president of the committee and judge. Mr. Greborio made an address in which he expressed the hope that cordiality and good feeling would be shown during the tournament. The rules governing the contest were then announced.

The competitors were received in the central office building on August 21 and the telegraph apparatus to be used for the contest was set into position.

On August 22 the contest began and was continued during the following five days. The records show that a speed of over 2,000 words per hour was attained on the Morse apparatus, and 1,500 words per hour on the Hughes instruments. The results on the Baudot system were "brilliant but not up to the average standard." In the Morse trials the two grand prizes were awarded to Italian contestants, and twelve gold medals went to Italian operators, three to Germans, two to Frenchmen, two to Belgians and one to a Swede.

In the Hughes contest the two grand prizes were awarded to operators from Belgium and Germany. Four gold medals went to Germany, two to Belgium, four to Austria, one to Hungary and one to France.

In the Baudot contest the two grand prizes went to France and gold medals were awarded as follows: Two to France, five to Italy and one to Austria. Silver and bronze medals were also given in each contest. The prizes were awarded on August 29.

The representative prize for groups of contestants from the same country was not awarded because there were no collective contests, neither was the championship prize awarded, for the same reason, all of the contestants entering individually. In the evening a banquet was held and congratulatory speeches were made and toasts drunk to the King of Italy and to the prosperity of foreign administrations.

New Hudson River Joint Cable.—A new cable is being laid across the Hudson river between Hudson and Athens, N. Y., for the use of the New York Telephone Company and the Western Union Telegraph Company.

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Telegraph and Telephone Exhibit at Boston Exposition.

The accompanying illustration shows a view of the exhibit of the Western Union Telegraph Company at the Boston Chamber of Commerce Industrial and Educational Exposition at Mechanics' Hall, Boston, Mass.

The American Telephone and Telegraph Company, the Western Union Telegraph Company and the Western Electric Company occupied one side of the main entrance hall. The telegraph line shown in the picture extended from the telephone switchboard to the Western Union board, and a large electric sign, reading "Telephone and Telegraph," was hung beneath the aerial cable messenger wire. The scheme of arrangement of the telephone and telegraph was such as to naturally bring to the minds of visitors the benefits which they now enjoy from the close relations of the two companies.

EXHIBIT OF WESTERN UNION TELEGRAPH COMPANY AND AMERICAN TELEPHONE AND TELEGRAPH COMPANY AT BOSTON EXPOSITION.

In the Western Union space was located the switchboard and an Athearn duplex and single Morse set. On the next table a full Athearn quadruplex was mounted and adjoining this table was a telephone order table, thus illustrating very effectively to visitors the practically instantaneous connection between the telephone located at their homes and the Western Union Telegraph lines. Further along in the Western Union space was located an automatic printer and perforator. At the extreme left was located a ticker transmitting system with two other tickers connected thereto. Near the front rail were two more tickers printing respectively New York and Boston stock quotations during market hours. Next to these was a Burry page printer which was also operated during market hours. On a pedestal near the entrance was located a relay controlling a lamp which flashed in accordance with the sounder service furnished by the Western Union Telegraph Company, giving the exact Washington Observatory time. On the end

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wall were five clocks, one being a master clock, and underneath these were a district call box and register.

All of this apparatus was set up for actual working and during the busy hours of the exposition, from 10 a. m. to 10 p. m., a force of operators, together with representatives from the commercial department, were on hand operating the apparatus and explaining the advantages of the service to the public.

A very lively interest in the exhibit was shown by the visitors at the exposition.

Railway Private Branch Exchanges.*

BY JOHN A. KICK.

In general office buildings, terminal yards, car shops and other points where a number of departments are represented a first-class telephone exchange service is necessary to the prompt handling of business in and between the several departments.

Originally one telephone was installed in the ticket or freight office and the agent expected to answer all calls, acting as a buffer between an impatient public and the railway company; whereas by the present method a private branch exchange, to which all departments have one or more lines, with skilled operators distributing the calls to the departments for which they are intended, avoids the annoyance of receiving calls intended for other departments.

The majority of the railways pay their exchange operators a good salary and as a result secure and retain excellent talent.

Railway officials must keep in touch with the changing conditions of the service, and to this end the private branch exchange acts as "information bureau" and is able, with very few failures, to locate any official upon a few moments' notice. The time-saved factor in railway work is of great importance and the private branch exchange has been a substantial contributor to that account.

When an official places a call through the private branch exchange he informs the operator whom he wishes to communicate with, hangs up his receiver and is called back when the connection is complete, thus saving to him the time intervening.

There has been a tendency toward overloading lines leading to these private branch exchange boards, causing heavy code signaling and slow service; but the situation is gradually clearing up, as it has been found that where service is justified good service is desired and can only be obtained by keeping down the number of instruments on the exchange lines, minimizing the annoying waits for an opportunity to use the circuit as well as doing away with the code ring.

Where two or more private branch exchange boards are installed at one terminal they are usually connected by trunk lines, with trunks from one or both to the nearest city exchange; but owing to the great desire to keep down wire mileage these trunks are not always of sufficient number to carry the service without serious delay.

The light on a private branch exchange board should preferably be a reflected, soft tone light, instead of a strong, direct light, which, reflected from the polished surface of the board, injures the eyes of the operator. The angle of the board with respect to the source of natural light, together with the wall and ceiling decorations, can just as well be arranged to produce a pleasing effect.

If possible terminal racks and cross connection frames should be so located as to be flooded with natural light for inspection and maintenance work, as well as prevention against rats and mice, which are liable to lurk in dark corners and destroy insulation.

All exchange boards should be separated from other departments and maintained as private offices, accessible to no one except in the discharge of duty, as good operating always needs the undivided attention of the operator.

Exchange operators are frequently required to do clerical work, handle telegrams (as phonegrams), and in other ways divide their time. On small exchanges where lines are short and the calls few this division of time of the operator may not be beyond good business policy, but where the exchange is a switching point for important through service or handles a heavy local business the accumulative loss of service, by reason of the operator not being free to give her whole attention to the operating, is considerable and if possible to capitalize would represent many times her salary per month.

The larger private branch exchange is under the direction and supervision of a chief operator and assistants who enforce the rules of discipline, correct methods of operating and stand responsible to the official under whose jurisdiction the exchange is operated.

*From *Telephone Engineer*.

Operating and Testing Manual.

"Electrician's Operating and Testing Manual" is the title of an excellent book by H. C. Hortsman and V. H. Tousley, giving 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 telegraph and telephone engineering. A careful reading and study of the book will give one a comprehensive knowledge of electrical application in all branches outside of telegraphy and telephony. It is free from higher mathematics and the facts given are easily understood, the language used in explaining them is so clearly stated. Every telegrapher should familiarize himself with the various applications of electricity and this work will help him acquire that knowledge. The book is bound in flexible leather covers, and is sold at $1.50 per copy. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, for copies of this or any other book on electrical subjects.

All telegraphers should subscribe for TELEGRAPH AND TELEPHONE AGE. It is up-to-date in all respects and highly interesting.

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Telegraph Transmission.

In the discussion of the paper on "Telegraph Transmission" presented by Mr. Frank F. Fowle at the Chicago meeting of the American Institute of Electrical Engineers, June 28, Mr. Bancroft Gherardi said:

Mr. Fowle gives an interesting discussion of the problem of insulating telegraph lines. This is a very important question and one to which much study has recently been given in the telephone field, with the result that we are trying out a number of special designs of insulators, both of porcelain and glass. The paper suggests that a suspended insulator be adopted on certain telegraph lines. Much time and study will have to be given to this question before it is demonstrated that it will be necessary to make such a radical departure from existing insulator methods in order to obtain the desired results. A great many mechanical difficulties would have to be overcome in connection with the use of such insulators on telegraph lines, and it does not seem to me that it is as yet by any means demonstrated that we cannot, by the use of insulators of suitable material and suitable design, and supported on pins in the usual manner, obtain the desired results more cheaply and more satisfactorily than by the use of a suspended insulator. The suggestion in question is an interesting one, however, and I am very glad that it has been made, but it is my feeling at the present time that other and less radical methods are likely to accomplish the desired results.

The author's suggestion that much use might be made of copper steel wire for telegraph circuits raises at once a serious question in my mind. This wire has, I believe, in general, an ohmic resistance of about 2½ times that of hard drawn copper wire of the same diameter. It would, therefore, seem to me that the same reasons which have led the telegraph companies to so generally employ in their more important circuits hard drawn copper wire instead of iron would deter them from employing a material which would represent a step backwards in this most important characteristic of a line.

MR. FRANK F. FOWLE: The points brought out by Mr. Gherardi in relation to suspended insulators for telegraph lines I believe are well taken. The choice of a satisfactory insulator is necessarily a compromise between cost and efficiency, and on that score everyone seems to agree that the ordinary glass insulators now in service can be much improved upon. The question is how far we can go in the direction of better efficiency before the cost becomes too great—or in other words, where is the point of maximum commercial efficiency.

Before we can answer this question it is necessary to know what we can accomplish in improving the physical efficiency, without regard to cost. After settling that part of the problem, a cost study will fix the highest points of efficiency which is commercially feasible. My proposal for suspension insulators does not go farther than the first stage of the problem, and is along the line of obtaining the highest degree of insulation which is physically possible. An insulator of the suspension type is admittedly objectionable from a mechanical standpoint where the line wires are crowded together on the pole line, with the smallest feasible separation. On the opposite hand it seems to possess numerous advantages where the wires are few in number comparatively, and the climatic conditions to be met are severe. It is probably too soon to state any conclusions as to what forms and types of insulators will finally survive as commercially the fittest for various classes of telephone, telegraph and signal service.

Mr. Gherardi's remarks in relation to the use of copper steel wire—or, as it is more familiarly known, copper clad steel—indicate that he is thinking principally of conductivity, without full regard for other requirements. Tensile strength is a factor quite as important as conductivity.

The commercial field for any conductor of a new type, such as copper clad steel, is necessarily a question of economics. The latter phase of the subject has not been treated in the present paper, but it will be found in somewhat extended form in my paper on "Line Conductor Requirements for Telegraph Transmission," read before the Association of Railway Telegraph Superintendents, at the annual convention at Boston, June 26, this year. The latter paper contains a full substantiation of the statement made by me in the present paper, that copper clad steel finds its economical field in the lines less than 300 miles in length, approximately, where no repeaters are employed. If automatic repeaters are made use of, the economical range of copper clad steel wire is limited only by the feasible number of repeater sets from an operating standpoint. One set will extend the range to about 600 miles and two sets to 900 miles.

The substitution of copper wires for iron by the telegraph companies is probably traceable to several causes. The difficulty of maintaining iron wire in good condition has increased of late years, owing both to the use of inferior metals in manufacture and to the more general presence of corrosive agents in the atmospheres of cities, industrial regions and along steam railroads. The difficulties are increased by the fact that the life of the joints is not equal to the life of the body of the wire. Joints deteriorate rapidly and increase in ohmic resistance. The substitution of copper greatly diminishes the rate of depreciation, because the oxide coating on the surface of copper is protective and arrests further corrosion while it remains intact.

Owing to the fact that the tensile strength of hard-drawn copper does not exceed approximately 65,000 lbs. per sq. in., it is not feasible to employ small wires, except in mild climates. The telegraph companies have settled on a standard of No. 9 B. & S., weighing 209 lb. per mile, which has a breaking strength of about 620 lb.

The use of copper clad steel wire in place of this conductor is not economical except where the conductance of No. 9 copper is in excess of the transmission requirements. For example, the use of No. 9 copper for a telegraph line 150 miles long is an economic waste of copper, because a much small-

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er conductor would provide the necessary conductance. At the same time the correct size of copper from a conductance standpoint would not be strong enough to sustain loads of wind and sleet, and would not give reliable service—if in fact it would stay up at all.

Such a case forms an ideal illustration of the value of copper clad steel wire, whose tensile strength is approximately 90,000 to 100,000 lb. per square inch. This type of wire could be substituted for solid copper, in this instance, with considerable saving in cost, because its superior tensile strength permits the use of smaller sizes than are permissible with copper.

Of course the substitution of copper clad steel for copper, where the size of copper needed electrically is also sufficiently strong mechanically, is out of the question. Had my statement that copper clad steel is an economical and suitable telegraph conductor been unaccompanied by the important qualification that 300 miles is the limit on its use in circuits without repeaters, Mr. Gherardi's general objection on the score of low conductivity would be well sustained. But in the light of all the analysis of the problem it seems to be clearly established that the superior strength of copper clad steel wire, taken in conjunction with present market prices, proves it economical for distances in simplex service up to about 300 miles.

Telegraph Rates in Great Britain and the United States.

In his annual report Mr. Theo. N. Vail, president of the Western Union Telegraph Company, has this to say in regard to telegraph rates in Great Britain which are generally used in arguments for government ownership of telegraph lines in the United States:

The telegraph rate of Great Britain is often used to argue the possibility for similar telegraph charges in this country or as an argument for government ownership and operation of the telegraph.

While the English rate is small, so are the distances and area covered by the rate small. According to the official figures of the British telegraph system, the deficit for the last year obtainable was over $5,000,000. This deficit includes interest only on a capital of about $50,000,000, whereas, as a matter of fact, there has been a total expenditure up to date, for capital expended and unextinguished, for loss of interest and for working expenditure over receipts, approximately, of $175,000,000. In the expenses charged against the revenue there are no allowances for depreciation or depreciation reserve. About $1,250,000 for extensions, not nearly enough to offset proper depreciation, is charged against revenue. No taxes are paid. This item is a large one in a private enterprise. No rental or charge for buildings owned by the Postmaster-General. There is no liability for or payment of damages from any cause whatever.

The wages paid to telegraph employes of Great Britain are only 50% to 70% of wages paid by the Western Union for same classes of service.

The average operating cost per message, official figures, which do not include any of the above mentioned material and unavoidable items of the expense of a private enterprise—is over 20 cents. If all the items were added to expense that would have to be borne by a private enterprise, the cost would be increased by a very considerable amount, certainly 25%, and probably nearer 50%, or increased to 25 or 30 cents. The average revenue per message is about 15 cents; in other words, one-half of the cost of every private telegram is directly and indirectly borne by the public revenue.

The telegraph system of Great Britain is and has been maintained for the convenience of its users at the expense of the general revenue. The British rate is 12 cents for 12 words and 1 cent for each additional word, address and signature counted and charged for. The Western Union 25-cent rate for 10 words (address and signature, an average of 9 to 10 words, free) covers about the same area in territory and the same average distance of telegram that the British rate covers. The territory of Great Britain is about the same as that of five middle States, but 75% of the population are within 200 miles of London.

Compared with the British telegraph wire system, the Western Union telegraph wire system covers an area twelve times as large. The Western Union wire mileage is five times as great. The Western Union has nearly twice as many offices. The distance between the most distant principal commercial centers is ten to twelve times as great as in the British system.

Comparisons of greater distances and larger rates cannot be made except on a Continental basis. The rates from London to European points vary from 4 cents a word, address and signature counted and paid for, covering distances from 225 miles, up to 12 cents a word, address and signature counted, for about 2,000 miles; while the Western Union maximum rate is $1.00 for 10 words, address and signature free, for 3,500 miles.

Heavy Telegraph Business at Base Ball Game.

During the first game of the world's baseball championship series at New York on October 14, 160,000 words of telegraph matter were transmitted from the Polo Grounds in less than two hours, over 48 loops. The longest circuit operated direct from the grounds was to the Denver *Times*, Denver, Col., a distance of 2,000 miles. The longest circuit of the Commercial News Department was to Kansas City. The greater part of the 160,000 words was not written at all, but was dictated direct from the reporter to the operator.

TELEGRAPH AND TELEPHONE AGE is the leading paper in these two fields and is progressive and newsy. Subscription price, $2.00 per year.

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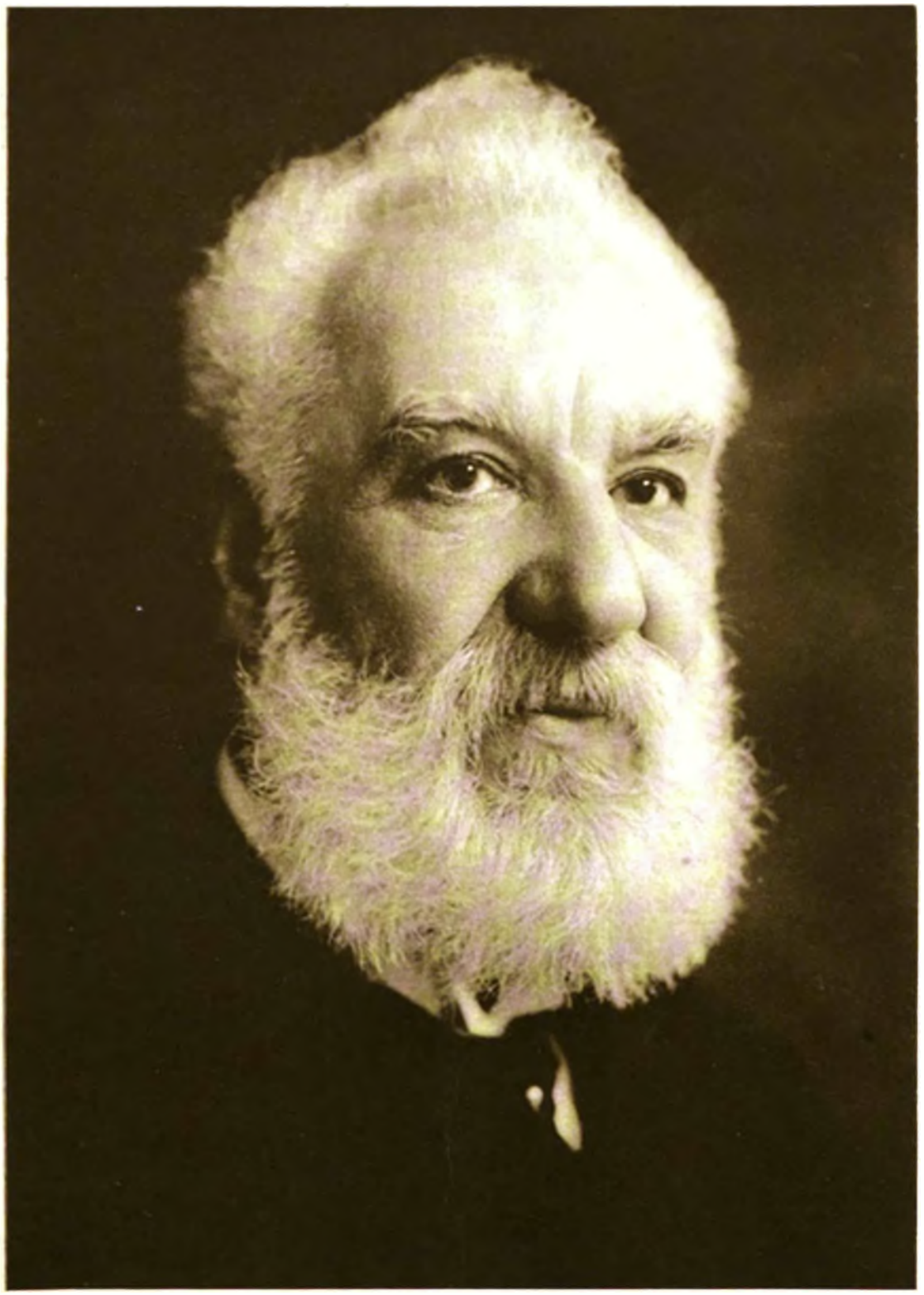

Dr. Alexander Graham Bell

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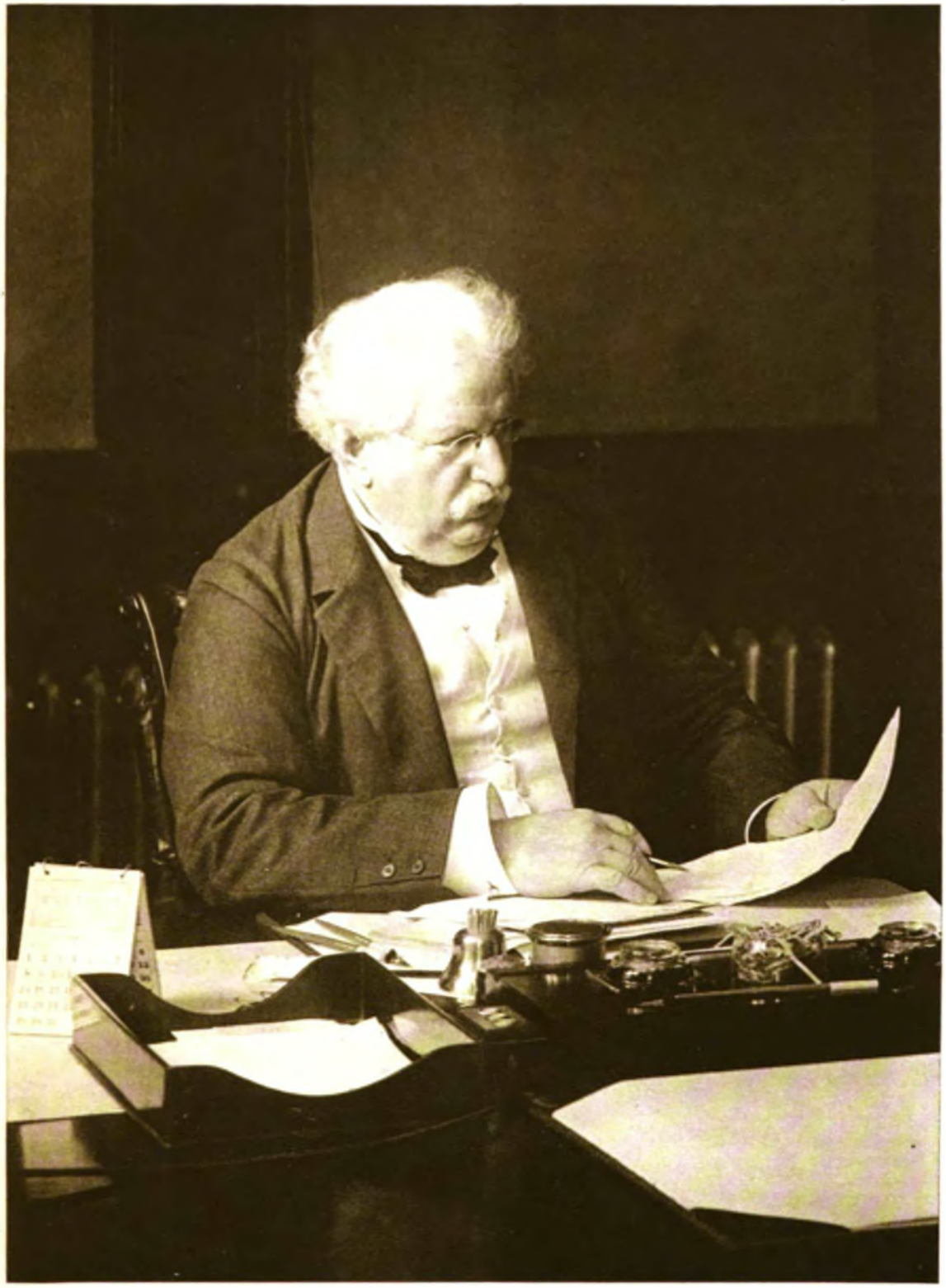

Theodore N. Vail

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THE TELEPHONE PIONEERS AND A HISTORY OF THEIR WORK.

INTRODUCTORY.

IT IS fitting that the telephone pioneers should meet in Boston to organize an association, for it was in Boston that the telephone was conceived and born, and Boston was for many years the center of its development.

The great expansion of telephony is a marvel in industrial history, and what makes it the more wonderful is the fact that the age of the industry is just half that of the life-time allotted to man. It is only 35 years of age, and history can nowhere exhibit a record of such rapid growth. Most of the men who contributed in any way whatever toward the upbuilding of this great organization are still alive, and, in fact, are yet young. They, to the number of over 200, have made a pilgrimage to Boston at this time to form an association to be called the "Telephone Pioneers of America," with a view to holding meetings annually and thus getting together on a social plane.

The term "pioneer" is usually associated in the popular mind with the idea of age, but that notion will have to be revised in this instance because the men in the association are not old in years, although they are certainly old in experience.

The two great figures in the history of the telephone are its inventor, Dr. Alexander Graham Bell, and Mr. Theodore N. Vail, who has been the master mind in the development of the business organization almost from the beginning. Dr. Bell furnished the cornerstone and Mr. Vail was the architect of the great superstructure which today is represented by the American Telephone and Telegraph Company and its associated companies.

DR. BELL AND HIS INVENTION.

It will be interesting in this connection to refer to the circumstances that led to the invention of the telephone and the difficulties and skepticism that the inventor encountered on every hand. But Dr. Bell seems to have had an insight into the future which his contemporaries knew nothing of, for had he not been so sanguine as to the ultimate value and success of the instrument he would have yielded to the discouragements which beset him on all sides.

Alexander Graham Bell was born in Scotland, and was educated in Edinburgh, the city of his birth, and in London, and in one way or another picked up a smattering of anatomy, music, electricity and telegraphy. At the age of 16 he left home to become a teacher of elocution in various British schools, and by the time he became of age had made several discoveries as to the nature of vowel sounds. Shortly afterward he met in London two distinguished men, Alexander J. Ellis and Sir Charles Wheatstone, who did more than they ever knew to forward Bell in the direction of the telephone.

When he was 23 years of age he moved to Brantford, Canada, with his parents. This was in 1870. In 1872 he went to Boston, Mass., where he lectured on vocal physiology at the Boston University, besides giving lessons to private pupils.

Now the telephone was not the only matter in addition to his regular duties that the inventor had on hand at this time. He was also engaged with inventions in harmonic multiple, and autographic telegraphy, and being too poor to prosecute his researches independently, had entered into an arrangement with certain gentlemen (one of whom, Mr. Gardiner G. Hubbard, subsequently became his father-in-law), under which they should pay the expenses of experimenting with these telegraphic inventions and of obtaining United States patents for them, while he should give up a portion of his professional work and give the time thus saved to telegraphic experimentation. These gentlemen, who thought something could be made out of the telegraphic inventions, but had no faith in the speaking telephone, and regarded it as being wholly chimerical and fantastical, naturally wished to push the multiple telegraph invention forward, and discouraged work on the latter. Dr. Bell was sure of his ground, however and he worked persistently until 1875 when the instruments he then turned out were really good, practical telephones.

APPLICATION FOR PATENT.

The application for the patent was filed in the Patent Office on February 14, 1876, and the patent when granted on March 7 of the same year bore the number of 174,465. After an eventful life of seventeen years, during which time it bore with invariable success the brunt of a litigation unexampled in the annals of patent law, it expired on March 7, 1893.

It was at this stage of its development that the telephone was exhibited at the Centennial Exposition held at Philadelphia, Pa., in the summer of 1876. Its exhibition there was the beginning of its public career. There, its capabilities and the remarkable results of its operation attracted the admiring attention of many distinguished votaries of science; and it was the recipient of much appreciative acclaim and laudatory remark from Professor Joseph Henry and Sir William Thomson (later Lord Kelvin) of the board of judges of the scientific section.

Stimulated by his Centennial success, the inventor of the telephone devoted himself during the latter half of 1876 to its improvement and made many structural advances, which for the most part he sought to describe and protect in a second patent granted to him on January 30, 1877.

COMMERCIAL DEVELOPMENT.

We now come to the commercial period of the telephone and all through its development we see the towering and commanding figure of Theodore N. Vail.

It was to Mr. Vail that the struggling infant industry turned for help in its early days and his has been the guiding hand through the greater part of its wonderful career.

The telephone had ceased to be a "scientific toy" and became an article of commerce. It began to be taken seriously, although the London *"Times"*

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had referred to it as the "latest American humbug." Mr. Gardiner G. Hubbard, was the first to become interested in the business end of the telephone, and Mr. Thomas Sanders supplied the little capital to start it. In a short time Mr. Hubbard was leasing telephones at the rate of a thousand a month. He was no longer a promoter but a general manager and it became necessary to find some one to organize the business.

"Watson," said Mr. Hubbard to Prof. Bell's assistant "there is a young man in Washington who can handle the situation. Run down and see what you think of him." Mr. Watson reported favorably upon his investigation and in a couple of days the young man received an offer from Mr. Hubbard to become general manager at a salary of $3,500 a year. "We rely," Mr. Hubbard said, "upon your executive ability, your fidelity and your unremitting zeal." The young man replied: "My faith in the success of the enterprise is such that I am willing to trust to it, and I have confidence that we shall establish the harmony and co-operation that is essential to the success of an enterprise of this kind." One week later the same young man, Theodore N. Vail, took his seat as general manager in New York and the building of the business began.

Line by line, Mr. Vail, mapped out a method, a policy, a system. He introduced a larger view of the telephone business and cast aside all proposals to sell out. Then the first Bell Telephone Company was organized with a capital of $450,000 and a service of 12,000 telephones. Having stiffened up the backbone of the little company Mr. Vail proceeded to establish a definite business policy. He revised the contracts and made them good for five years only; he confined each agent to one place and reserved all rights to connect one city with another. He established a department to collect and protect any new inventions that concerned the telephone, and took steps toward standardizing all telephonic apparatus by controlling the factories that made it. All of these measures were part of Mr. Vail's plan to create a national telephone system.

It was soon recognized that the future of the telephone was highly promising, and many bright young men, largely from the allied industry—the telegraph—cast their lot with it, and thus came to the aid of Mr. Vail in carrying on his great work. There was no precedent to follow; it was a new enterprise and all knowledge concerning the business was derived at first hand through experimentation. The development soon reached a point where it was seen that more scientific methods were imperative in the engineering and operating departments, and then the colleges furnished trained minds to place the business on a scientific basis. Mr. Vail's methods were so far-seeing and his judgment of men was so keen and accurate that he soon gathered around him a staff of assistants whose ability and loyalty have challenged the admiration of the world.

Most of the men who have figured in the wonderful development of this industry are expected to be present at the organization of the association of telephone pioneers in Boston, and no doubt many entertaining stories will be told of their early experiences. The American Telephone and Telegraph Company today stands as a monument to their work and skill, and at the end of this article their names are given.

HISTORY OF THE TELEPHONE.

A brief review of the history of the telephone from the time the first line was established will prove of interest at this time.

The first telephone line was erected in Boston in the spring of 1877 between the factory of Mr. Charles Williams, Jr., the manufacturer of the telephone, and his residence at Somerville. This line was finished and put in operation on April 4, 1877. Numbers of people came to see and try it, and orders began to come in for telephones and telephone lines.

Before the end of April other telephone lines were constructed, connecting Professor Bell's laboratory

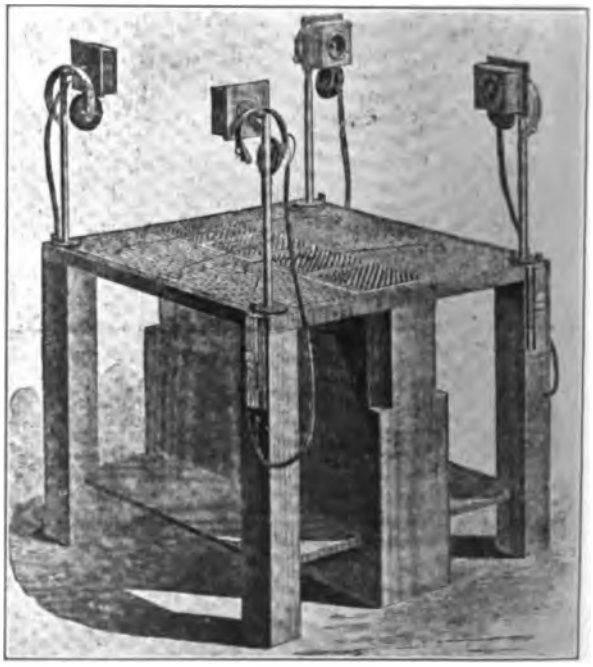

FIG. 1.—FOUR-HUNDRED LINE LAW SWITCHBOARD, 1878.

in Boston with the factory of Mr. Williams, and other points in the city, and in the early part of May an agreement was made with the Board of Waterworks of the neighboring city, Cambridge, Mass., for the equipment with telephones of a line connecting the principal office of the department in the city with the works at Fresh Pond, a couple of miles distant.

The idea of using the telephone as a time-saving appliance, and as a means of communicating intelligence, began to spread; and telephone lines put up for business purposes in the city of New York and in Altoona, Pa., closely followed the Cambridge installation.

During the months of April and May, 1877, applications for agencies began to come in with increasing frequency, and the business management was constantly engaged in disposing of exclusive privileges and territorial licenses under the patents, and in meeting the rapidly enlarging demands for telephones.

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THE FIRST EXCHANGE.

Boston was the scene of the earliest instance of the interconnection on the exchange plan of lines having out-stations equipped with telephones for direct communication between the stations of any two lines, and this occurred in May, 1877. At this time the business of providing electrical protection against burglary was carried on by the Holmes Burglar Alarm Company, and to this company a number of telephones had been furnished for trial and experiment. From the central station in Boston burglar alarm circuit lines radiated to a number of banks and stores, each line being provided with apparatus at the central point by means of which the burglarious entering of its station might be announced; and arrangements were made for the use

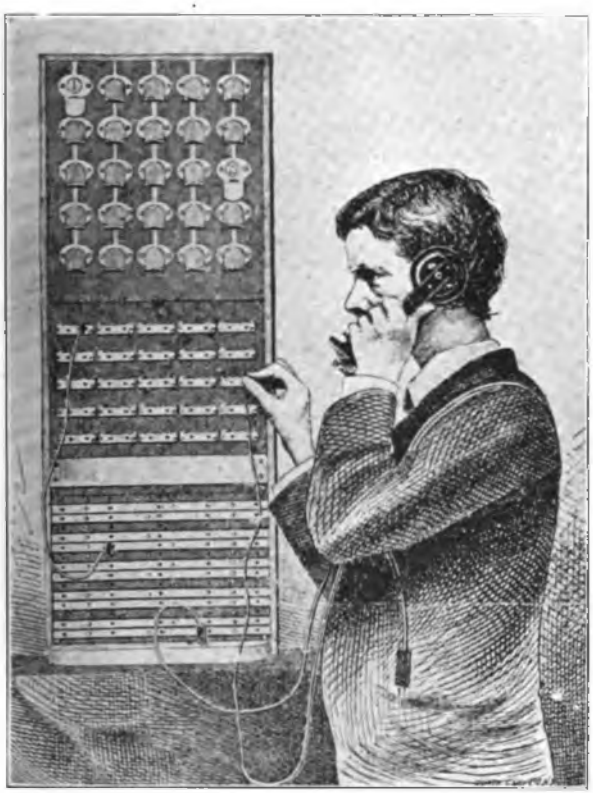

FIG. 2.—SECTION OF SWITCHBOARD, PHILADELPHIA EXCHANGE, 1879.

of these lines, their sub-stations, and the central station as an experimental telephone exchange. These lines were repeatedly interconnected, and many conversations were interchanged between their stations, the burglar alarm apparatus being employed to transmit the regular call signals. This was in fact the first telephone exchange.

From this time forward the work of furnishing telephones and of sending them out for commercial purposes advanced by leaps and bounds. By the late summer of 1877 it had become clear that some sort of an organization was necessary to take charge and properly supervise the commercial development of the telephone, which was assuming dimensions of very considerable magnitude. As a temporary expedient, the owners of Mr. Bell's telephone patents, who at this time were very few, including merely Mr. Bell, Mr. Gardiner G. Hubbard, certain members of their respective families, Mr. Thomas Sanders and Mr. Thomas A. Watson, Mr. Bell's assistant, formed themselves in August of that year into a sort of informal unincorporated association having no capital; to which was given the name of the Bell Telephone Association. It was formed to assist and act in support of Mr. Hubbard in the management of the business relations of the telephone, and in devising the best means for its general commercial introduction.

By this time the work of the Bell Telephone Association and its management had become so heavy that the expediency of a more formal and more effective organization of ownership was manifest. The Association realizing this necessity, took its first action in this respect by forming the New England Telephone Company, which was incorporated under the general laws of Massachusetts on February 12, 1878, with a capital of two hundred thousand dollars, and by granting it the exclusive right to use, license others to use and to manufacture telephones in the New England States.

Attention was next turned to ways and means for extending the use of the telephone throughout the United States outside of New England; and to this end the Association proceeded to create the Bell Telephone Company, which was incorporated with a capital of four hundred and fifty thousand dollars, July 30, 1878, also under the general laws of Massachusetts.

The telephone central office system at New Haven, Conn., was opened for business on January 28, 1878, and was the first fully equipped commercial telephone exchange ever established for public or general service, and by March, 1881, within a year after the American Bell Telephone Company began business, there were in the United States only nine cities of more than ten thousand inhabitants, and only one of more than fifteen thousand, without a telephone exchange.

In March, 1879, the Bell and New England Telephone Companies were coalesced and the new organization, with a capital of $850,000, was called the National Bell Telephone Company. At the close of the year this Company stood alone as the proprietor of telephony within the United States. The scope and plan on which the National Bell Telephone Company had been organized were seen to be incommensurate to the expansion already in sight. Accordingly, on March 19, 1880, the American Bell Telephone Company was incorporated by a special act of the Massachusetts legislature with an authorized capital of $10,000,000, and, purchasing the property, took over the business of the National Bell Telephone Company. In conformity with the growth of the business, the American Bell Telephone Company increased its capital from time to time, so that at the end of 1899 the outstanding stock amounted to about $26,000,000. The property and business of the company were then transferred to the American Telephone and Telegraph Company, a separate corporation which it had organized in 1885 to develop the long line business,

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and the American Bell Telephone Company discontinued its general business.

When in the spring of 1880 the American Bell Telephone Company assumed charge of the business there was no underground construction, and the

FIG. 3.—SWITCHBOARD USED IN NEW YORK IN 1880.

lines, for the most part of iron or steel, were altogether on roofs or poles.

The telephone circuits were single wire lines with earth returns; cable making was an imperfectly mastered art, and cables crude and untrustworthy; the use of copper line wire was little known and discountenanced; there were no standards in construction and apparatus, every man doing and adopting what might be right in his own eyes.

Since that time metallic circuit low capacity polyconductor cables, mainly employing air as an insulating medium, have been devised, and their employment has become universal; underground construction has become the rule instead of the exception; beginning with the year 1886 a metallic circuit system of long distance lines has been built of hard drawn copper wire, and has overspread the country; the average excellence of these long lines, terminating as they do in switchboards at exchange central stations, has resulted in correspondingly improved construction in exchanges everywhere, including the substitution of copper for iron as a material for line wire, and the metallic circuit for the ground return single-conductor line; the operating companies now have their own buildings specially designed to accommodate the central station operating rooms, and affording facilities for the ingress of the subterranean cables; an elaborate system of protection has been provided for both ends of each telephone line, and where such lines pass through cables, at the cable ends also, to take care of trespassing currents strong enough to be destructive; and lastly, but by no means of least importance, the old and well-known hand-operated magneto machine—for years the most approved call-sending apparatus—and the multitudinous batteries of which one was provided with the transmitter of each user to furnish current for its operation, have both been superseded in the modern well appointed exchange, by a single central station battery which supplies

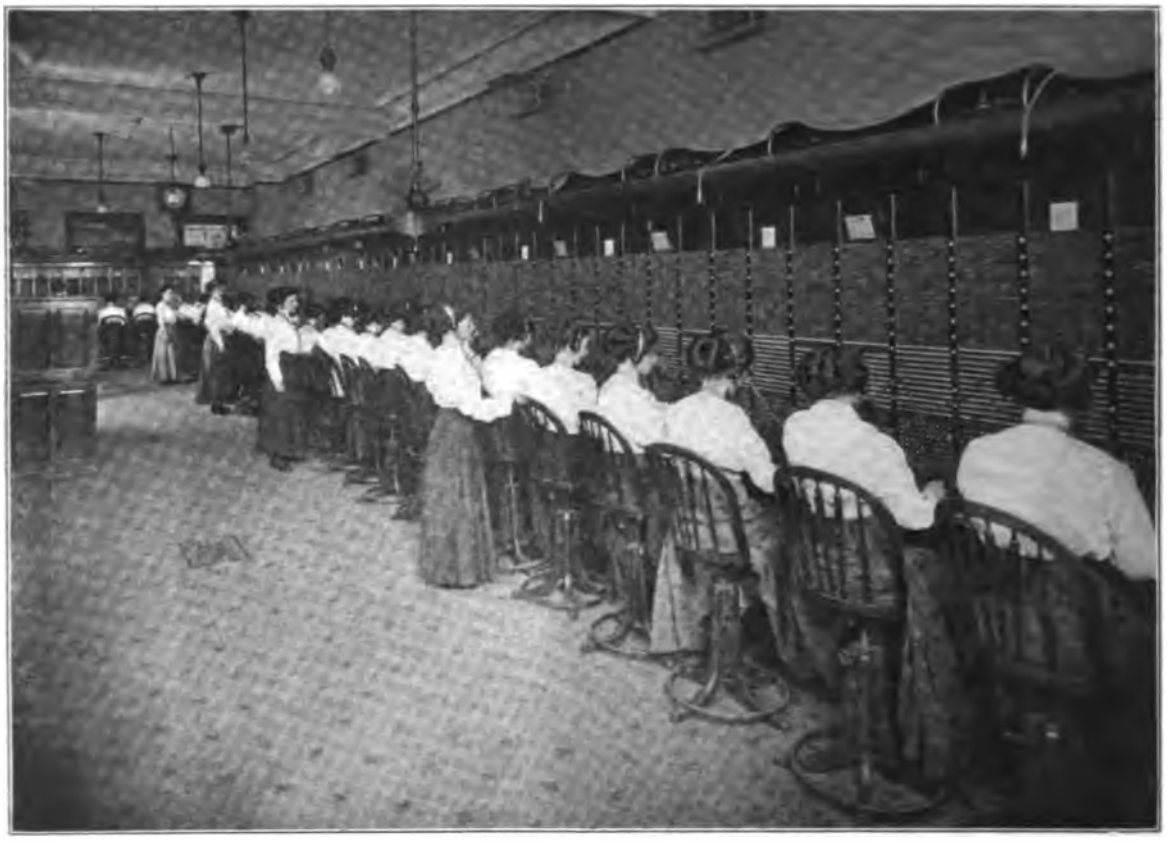

FIG. 4.—MODERN TELEPHONE EXCHANGE IN NEW YORK.

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not only the electric current for all the transmitters of the outlying stations, but also for the transmitters of the central station, and for the switchboard lamps used for call and supervisory signals.

These advances which have systematized the technical side of telephony, and which have received the approval of, and have been made available by the foremost telephone engineers in all parts of the earth, are largely attributable to the ability and persevering application of the headquarters' engineering staff; and to the stimulating and encouraging attitude towards practical and meritorious improvement in appliances and methods which has uniformly characterized the management.

The original plan upon which the telephone business was started provided for the issuance of a license by the American Bell Telephone Company, the owners of the patents, to use the Bell patents within certain defined territories, the instruments being furnished by the Bell Company. Rights were given to use the invention in perhaps a single county, or even a single city; but as time went on it was found that this did not yield the best results, so the consolidation of local telephone interests into large companies covering many counties, and even in several instances the whole or the greater part of the entire States was undertaken.

With the movement towards consolidation it was seen at once that large sums of money must be raised for the extension of the business; and in order to aid the operating companies, and at the same time to keep such an interest in them as would enable the owners of the patents to assist in giving the public telephone service, the policy of the company owning the patents was to invest in the stock of the companies operating under licenses, and funds, secured by issue of the stock of the American Bell Telephone Company, were sown broadcast in construction over the whole United States.

The result of this policy of investment in local companies has been that the American Telephone and Telegraph Company has at present a financial interest in the telephone business in every part of the United States. It has persistently and steadily worked towards the end that there shall be a system of telephone and telephonic communication so homogeneous in its construction and its methods that, regardless of the part of the country where it may be used, or however distant the point with which communication may be desired, every part of the machinery of administration and operation shall work together harmoniously to give the best possible results to the public.

LONG DISTANCE SERVICE.

The American Telephone and Telegraph Company is only in a minor degree an operating company. It has a department which builds and operates the so-called Long Distance lines, whose object is to tie together the districts of the various local companies, and to handle the business which passes from the territory of one of the operating companies into that of another.

Starting in 1884 with the experimental line between Boston and New York, the long distance service has grown with enormous rapidity, until today it reaches over all of the eastern section of the country, meeting the Canadian system at various points on the boundary line, and extending beyond the Mississippi to Denver, Col., embracing therefore all of the United States east of the Rocky Mountains.

With this growth there has sprung up a multitude of new uses for the telephone. We find in office buildings and hotels the private branch exchange; telephones of special design, adapted for special uses, may be found in mines and on railroad and street railway systems, and in some of the larger and newer houses the older systems of electric bells and speaking tubes have been displaced by a private telephone equipment communicating with every part of the house.

Trains have been equipped throughout their entire length with telephones, so that travelers may converse without the trouble of passing from one car to another, and when the train draws up to a railroad station, by means of a flexible conductor the train system is connected to the local system, so that passengers may talk to their friends in the town, and may even carry on long distance conversations. Steamships are provided with interior telephone systems, and these can also be connected to that of the city when the steamer is lying at the dock.

One of the most interesting fields of recent development of the telephone has been in the application of the telephone to the railway service. Telephone messages and telegraph messages may be sent simultaneously over the same wire, and at small stations and out-of-way points it is no longer necessary to have a telegraph operator, as by the introduction of the telephone on such lines the station agent may be in constant communication with the train dispatcher and officials at headquarters.

More important from a social standpoint than any of these mentioned has been the rapid extension of the telephone among the farmers and into the rural districts. In many places farmers have built their own lines into the exchange limits, and placing from ten to twenty instruments on a line, have thus put themselves into close communication with their market towns and the larger centres of population. The farmers on any individual line are able to converse with one another without calling up the central station, and by means of the central office, often located in a farmer's house and attended by his wife or daughter, these isolated farm houses can be brought into connection with all the surrounding country.

PRESENT DAY TELEPHONE STATISTICS.

In his report for the year 1910 President Vail of the American Telephone and Telegraph Company says:

"The interest of the American Telephone and Telegraph Company in its associated operating companies is over 80 per cent, in addition to which it has its own earnings. The American Telephone and Telegraph Company's share of the surplus earnings of the Bell system is approximately 90 per cent, so that the showing of real interest to the security holders of American Telephone and Telegraph Com-

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pany lies in the figures of the Bell system as a whole.

"The number of exchange stations connected with the Bell system December 31, 1910, was 5,882,719, an increase of 740,027 for the year. The increase for the year was nearly as great as the total number of exchange stations ten years previous. Of this number 1,852,051 were stations of independent companies, called connecting companies, operating as a part of the Bell system under sub-license or connecting contracts.

"The total wire mileage, not including that of connecting companies, in use for exchange and toll service was nearly 12,000,000 miles, an increase of nearly 1,200,000 miles for the year. Fully one-half of the exchange wire mileage is underground. There were 167,800 miles of toll and long distance pole lines, with nearly 2,000,000 miles of toll and long distance wires. The public indulged in over seven thousand million conversations during the year at an average cost of a little over two cents a conversation.

"Plant additions during the year cost $53,500,000. The total addition to plant in the past 11 years amounted to $460,750,000. The total property additions during the year were $84,000,000.

"The gross revenue collected from the public in 1910 for telephone service by the Bell System—not including the connected independent companies—was $165,600,000; an increase of nearly $16,000,000 over last year. Of this operation consumed $54,000,000; taxes, $8,000,000; current maintenance, $25,700,000; and provision for depreciation, $26,200,000. The surplus available for charges, etc., was $51,000,000, of which $11,550,000 was paid in interest, and $25,000,000 was paid in dividends to the public.

"The average earnings per exchange station for exchange service were $31.28, as against $44.68 for the year 1900. The average net earnings, including toll earnings, per exchange station, were $10.15, as against $15.60 in 1900. The average construction cost per exchange station was $117.00; including the toll lines, $142.00, as against $199.00 in 1900."

This then is the new art, the new and greatest service of intercommunication the world has yet seen, which has been developed and spread the world over by the men assembled in Boston today—the Telephone Pioneers of America and their associates.

Russian Telephone Service.—The telephone service in Russia is maintained partly by the Government and partly by private companies. The zemstvos are also exploiting the telephone service in sixty-nine counties. The Government maintained ninety-nine urban telephone lines and four long-distance lines. Besides this a telephone service was carried on between thirty cities by means of telegraph lines for the purpose of transmitting telegrams. The receipts from the Government's telephone system amounted to $1,370,855 and the expenditures to $774,393, yielding a profit of $596,462. A telephone service was also maintained in fifty-five cities by private companies.

Pioneers of the Telephone.

Following is a list of the telephone pioneers, classified by the years in which they entered the service:

1875.

Bell, Alexander Graham, June
Harrington, Frank W.
Watson, Thomas A., June

1876.

Barton, Enos M.
Kinsman, F. E.
Maynard, Geo. C.
McCluer, C. E.
*Sargent, Wm. Dunlap

1877.

Baker, Hugh C., Oct. 18
Brown, Robert
Candee, Willard L., Aug. 31
Childs, W. A., May
Denver, W. J.
Devonshire, Robert W., Aug.
Doolittle, Thos. B., June
Dunstan, Kenneth J., Oct.
Ehrlich, Herman
Field, Stephen D.
Ghegan, John J.
Glidden, Charles J., May 8
Holmes, E. T., May
Jackson, W. A., Oct. 1
Joyce, Martin J., Nov.
Korty, L. H., Nov.
Lillie, N. W., Oct. 8
Mason, F. C., Oct.
Murphy, J. O., June
O'Brien, Richard
Pope, Henry W.
Rolfe, Charles A., March
Scribner, C. E.
Wainman, C. P.
Wiley, Geo. L.
Wilson, Charles H.
Wood, F. G.

1878.

Adee, Daniel M., June
Adkins, W. H.
Adler, C. H., April 1
*Allen, Fred'k A., May 1
Bailey, Thos. B., Feb. 28
Baker, Ellis B., Jan. 31
Bawsel, E. E., Feb. 6
Berliner, Emile, Sept.
Betts, George E., June 1
Blake, Francis
Boeggeman, J. H., May
Butler, John K.
Cornish, Thomas E.
Crenshaw, A. P., Sept. 22
Culbertson, J. N., April
Delano, Frederick M.
Delany, Geo. W., Oct. 1
Doolittle, Chas. B., July
Evans, Wm. R., Sept. 25
Hall, Edward J., Nov.
Kelleher, Chas. F., Oct.
Ladd, J. W.
Lockwood, Thos. D.
McComas, R. T., Sept. 1
Martin, J. J., April
Martin, T. Commerford
Mehaffey, J. H., Sept.
McCoy, John A.
Richards, W. L.
Schultz, H. J., Dec. 26
Thompson, A. K.
Vail, Theo. N.
Vaille, Frederick O., Nov.
Wadland, Thos. H., Nov.
*Watson, Henry M., Nov.
Westbrook, W. T., April
Woelk, Edward A., June
Woolverton, W. H.

1879.

Baxter, M. S., April
Boutillette, H.
Boyce, C. L., Oct. 8
Brown, Joseph M., May 1
Brownell, C. H.
Burleigh, Chas. B., Aug.
Buttrick, F. A., Aug.
Byrne, C. J., Aug. 1
Carney, M. J.
Carrigan, G. H., June 30
Carty, J. J.
Chapman, Wilson S., Nov. 1
Conn, F. W., Aug.
Daboll, Frank G., Mar. 21
*Eastabrook, W. N., Sept.
Fitch, D. H.
Fitzpatrick, Thomas P.
Gallagher, A. C., April
Gardner, C. E., Oct.
Gentry, W. T.
Hanchett, W. D.
Helsher, Louis H., Dec. 3
Hyde, Henry D.
Kearns, John, Sept.
Keenan, W. J.
Keller, Jasper N.
Kilbourne, H. W., Nov. 1
Lillie, Edward E., April
McDaniel, Chas. W., May
McFarlane, Lewis B., July
McLellan, Alexander
Mackenzie, Cecil W., April 1
Manson, Geo. T., Dec. 7
Milne, G. D., April
Moran, Jno. M., Aug. 6
Nicholson, Chas. A., Nov.
Paynter, W. D., Jan. 1
Pittman, Edward Y., June
Root, Charles M., Jan.
Sherwood, E. F., June 10
Smith, A. T., Dec.
Stanford, Joseph D., Nov.
Stearns, J. W., March
Storke, H. L., June
Sunny, Bernard E., Mar. 1
Thomas, M. F., Feb.
Truex, Charles R., Sept.
Warner, Frank E., Dec. 1
Willard, Edmund S., May
Wilson, Eugene M., May 17

*Deceased.

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1880.

Allen, A. M., Feb. 1
Bloodgood, F. S., April 14
Brennan, J. P., Nov.
Bush, W. H., April 23
Cahill, John H., May 5
Clarke, E. N., July
Driver, W. R.
Eanes, H. O., Aug. 1
Emery, Howard B., June
Esten, W. E.
Field, E. B., Jan. 21
Garvey, W. J., Sept. 1
Good, W. G., May
Howard, Chas. T., Jan. 16
Janke, C. A., July 10
Knight, Frank B., May
Litton, R. N., April
Lyon, E. H., Oct.
McCully, Harry G., July 1
McFarland, G. E.
Murphy, John F., April
Nesbit, T., March
Noyes, W. I., Nov.
O'Brien, P. W.,
Pierce, George W., Feb. 5
Pigott, Thomas E. Feb. 1
Raup, K., October
Roberts, A. P., Nov
Ross, Frank C., Dec. 17
Sise, C. F., Jan.
Sloan, W. D., July
Smith, Alonzo W., Mch. 16
Smith, Sidney H., Sept.
Snook, Stephen D., May
Sperry, Walter N., Nov. 1
Thomson, M. A., May 20
Vail, J. Cummings, June
Warth, N. G., Jan.
Wilson, D. Leet, Jan. 8

1881.

Barrett, John A., July
Beamer, James, May 1
Bender, Arthur F.,
Boynton, F. J., Sept.
Burgess, E. M., Nov. 1
Chambers, J. A., June
Clower, D. M., June
Dwyer, T. J.,
Fish, Frederick P., Nov. 26
Freedy, B. L., Oct. 1
Hays, W. S., Jan. 1
Hibbard, Angus S., July
Higgins, P. Kerr, Sept.
Hoover, Robert B., Apr. 1
Ingram, Thos. L., Feb. 2
Keech, T. J., April 1
Longley, Edmund W., Sept.
MacCrellish, John A., Feb. 1
McDonough, F. J.
Menzies, James
Murphy, D. J., Jan.
O'Rourke, John, Jan.
Peaty, John C.
Phillips, A. D., July
Reynolds, P. G., July 22
Salt, A. L., July 7
Seely, C. G., Nov. 15
Smith, Frank E., Nov. 1
Smith, S. Fred., March 7
Stone, A. C., Oct. 1
Thayer, H. B., Jan.
Throop, B. J., March 1
Uhrig, Frederick B., Oct.
Watson, H. P.
Wilder, H. W.

1882.

Baker, K. S., April 22
Bellard, H. W., June
Blake, J. T., March
Brown, N. Warren, Nov. 22
Buehler, M. H., Dec. 16
Carpenter, I. B.
Collins, Dennis L., May 11
Cook, W. R., March 1
Dickinson, Chas. C., Dec. 20
Donohoe, Francis E., June 30
Eddy, W. B.
Embler, A. H., May
Flanagan, James H., Aug.
Ford, E. C., Oct.
Forbes, Frederick A., Oct.
Foster, Geo. W., March
Gibson, J. W., Nov. 27
Hennigh, Minnie M. E.
Huebner, S. T.
Huntington, W. E., July 1
Keys, Miss Betty E., May 1
Lewis, Frederick P., July
Long, Thos. F.
McLoughlin, W. J., May
McQuarrie, J. L., July
Maiden, Wm. J., Oct.
Many, Augustus, Feb. 8
Milburn, T. W., Jan.
Price, Charles W., Dec.
Ryan, Isabella B., Feb.
Skolsky, Phillip Jacob
Smith, Emor A., Jan.
Thompson, Geo. K., May 15
Vaille, Howard T., Dec. 26
Whalen, J. B., Jan. 1

1883.

Barrett, A., May 1
Berthold, Victor M., Sept. 20
Clark, E. A., April 1
Corrigan, Edward, June 21
Crews, J. William, May
Crouter, G. W., July 1
Depuy, A. B., Sept.
Dusenbury, Thos., Jan. 1
Ennis, U. P., Nov. 17
Failing, C. C.
Gannon, Mary J.
Gillespie, Jas. W. June 22
Graham, Willard, May
Grant, Chas. A., March 26
Henderson, J. S., June 11
Hoyt, G. W., Jan.
Hutt, W. C., Nov. 25
Hyde, W. H., Dec. 20
McCoy, H. A.
Lloyd, B. F.
Lohmes, Hardy T., April
Martin, Wm. D., June 15
Mellen, A. J., Jan.
Oliver, B. A., Oct. 13
Overbeck, Frances, May 19
Ovitt, C. L.
Peckham, Fenner H., July 13
Pond, George S., Sept. 1
Sapp, H. T., Sept. 3
Sherwin, Thomas, March
Stitt, J. K., May 1
Wallace, Geo. Y.

1884.

Abbott, E. W., Jan.
Badour, W. H., May
Barry, J. H., April 30
Bates, H. G.
Bradshaw, Thos. N.
Carter, O. H., Feb. 1
Christie, J. W., July 12
Cochran, R. B., Feb.
Cole, Minnie E., Dec. 1
Day, C. B.
Ellis, W. P., May 1
Ford, Wm. A., July 1
Hall, Chas. E., April 1
Herzig, Andrew H., Oct. 19
Hoffman, Miss Sue, Mar. 4
Howarth, Walter S., Feb. 11
Ives, A. W., Feb.
Jacobs, W. J. C., May
Johnson, W. W., June 10
Kennedy, James A., July
Meyers, S. H., March
Miller, Norton, Sept.
Moran, James T., Sept.
Olheiser, W. W.
Pitman, Chas. W., March
Powell, T. L., Feb. 14
Ray, M. D., March 10
Spencer, P., August
Taylor, Edgar L.
Van Buren, Geo. M.
Vaughn, W. W.
Wilde, Chas. E., Nov. 13
Wright, R. L., May 1
Yensen, P., Jan.

1885.

Allen, H. E., May
Baker, P. K.
Blake, Adelle W., June
Brown, Thomas S., Aug.
Caldwell, James E., May 1
Canfield, James F., Dec.
Campbell, A. S., Aug.
Doyle, James, Aug. 15
Egleston, Melville
Farnsworth, J. E.
Gates, C. A., Feb. 7
Gurnee, E. Alonzo, May
Hall, Laura M., Sept.
Hayes, Hammond V., Dec. 7
Heep, W. G., Nov. 12
Houston, Francis A., Mar.
Hume, Leland, Oct. 16
Hutton, N. H.
Kaiser, Barney A., Oct. 17
Kraft, Herrmann, Oct.
Lane, M. J.
McAdoo, J. D., Jan.
McCoy, Edwin L.
McMeen, S. G., Jan.
Marshall, H. P., July 27
Murphy, E. L., Sept. 5
Tuttle, Alonzo W., July 25
Wilson, J. W., Aug. 1

1886.

Baker, Wm. H., July
Cottrill, E. B., Oct. 10
Dodd, Amzi, Nov.
Ferry, J. M., Sept. 11
Fuller, Charles H., May 1
Huidekoper, H. S., Jan. 1
Ingalls, S. C., Dec.
Leverett, Geo. V., Feb.
McDonough, James
McLeod, John D.
Meany, Edward P., July 1
Pickernell, F. A.
Wass, James K.
Wilt, George P., July 19

1887.

Bedlow, F. E., July 18
Dawson, W. E.
De Lany, W. W., Oct.
Field, E. B., Jr., Jan.
Griffin, F. W., Dec.
Gruber, Adolph A., Dec. 16
Hubbard, Chas. Eustis, Aug.
Hussey, E. A., April 25
Liesinger, Theo. L., Dec. 1
McDonald, Henry, Nov. 27
McElligott, E., Aug. 1
Milton, W. B., July 1
Morris, S., June
Perkins, W. B., Dec. 5
Reilly, Peter T., April
Rogers, E. B., Sept. 1
Sommers, H., September
Starrett, S. H., Aug. 1
Strout, Harry, July 11
Swaney, F., June 1
Tulloch, G. S., July
Weaver, W. H. M.

1888.

Bangs, C. R., Nov. 1
Bangs, Edward H., Jan. 9
Bethell, U. N.
Brown, Walter, Jan. 1
Cline, Robt.
Curl, Harry J.
Dittmer, Adolph M., May 14
Durant, Charles, May 1
Gibbs, D. R., May
Hathaway, J. F., July 15
Hoppins, W., March
Kinnard, L. H., June
Macdonald, J. E., Mar. 12
Maben, J. G., Feb. 27
Madden, L. A.
Nelson, Frank G., Sept. 1
Smith, Chauncey, Oct.
Starrett, R. H., Oct. 15
Truex, Wm. H., Oct.
Vance, Henry C.
Welch, J. J.
Wright, Walter A.

1889.

Abbott, Wm. Rufus, Mar. 1
Bell, Edward W., Feb.
Berry, W. J., July 1
Blood, Jno. L., Sept. 3
Bunton, W. W., Oct. 1
Clifford, J. M., Sept.
Cline, J. H., Jan. 1
Cole, Chas. D. M., Dec.
Conoley, C. H., Jan. 9
Cox, D. C., Dec. 15
Cunningham, John, Feb. 1
Fraser, C. K., May 10
Fullerton, D. P., Dec.
Gately, Joseph A., June 26
Green, Arthur B.
Ingram, Miss Bessie, Aug. 15
Lyons, J. H., Aug.
McCabe, J. Albert, Feb.
Marriott, S. H., Aug. 12

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Moody, John F., Oct. 27
Moore, R. A., Dec. 15
Mosley, Chas. E., April 1
O'Hea, J. F. X., Dec. 18
Owens, Archibald A., Feb
Schoch, Jacob, April 15
Silvers, Olive, June 21
Smith, C. B., April 21
Soderstrom, John, Nov. 1
Yost, C. E., Aug.

1890.

Avis, C. D., June 30
Bethell, F. H., Nov.
Cutts, A. E., June 10
Dement, A. K., June 1
Greer, Sam'l Miller, Aug.
Holcomb, Alfred E.
Jacobs, P. O., Sept.
Kesterton, W. H., Sept.
Knetzer, John E., Jan. 1
Larned, S. J., July 1
Morgan, Richard J., Aug. 1
Morgan, Wm. J., Jr., Apr. 20
Newton, Walter R., June 10
Platt, G. P., July 1
Powell, Frank, Sept. 1
Simpson, F. C., Sept.
Smith, Chas. H., Oct.
Toomey, Florence T., April 4
Walker, Clement I., July 15
Wright, I. O., July 1

Early Days of the Telephone in Pittsburgh.

In a letter Mr. Thomas B. A. David, an old time telephone man of Pittsburgh, Pa., tells of the organization of the Central District and Printing Telegraph Company, and his early experiences in its development.

"The company was organized by me in 1874," he says, "for the purpose of putting all the larger concerns in Pittsburgh in communication with each other by means of printing instruments and a central office. I began the business with one boy, John Connors, now an operator in the Pittsburgh office. Early in June, 1877, Mr. Gardiner G. Hubbard, who was in full control of the Bell Telephone, came to Pittsburgh to see me. When he explained the object of his visit I said, 'Oh, it is only a toy and I am too busy to give the matter any attention.' He replied, 'Don't say that: come to my room.' There he produced some magneto telephones. I was not slow to see a merit in the invention. Its possible, useful feature absorbed my whole attention, and I conducted many experiments under all sorts of conditions.

"The first experiments in Pittsburgh were made between my house and a building on the rear of the lot, and soon after I had a wire strung from my office in the First National Bank Building to the Iron Exchange on Fourth Avenue for public exhibition. I also had a wire from one end to the other of the Exposition Building in Allegheny, for the same purpose. It has recently been told that Professor Alexander Graham Bell sought out a man to do this experimenting at the exposition, to whom he offered a large interest. Professor Bell had nothing to do with the introduction of the telephone in Pittsburgh, and Mr. Hubbard had control of the business end of Bell's invention.

"On one occasion, in July, 1877, I made a long distance (!) test between Somerset and Mt. Pleasant (some 20 odd miles) by metallic circuit. Mr. David Fleming and Mr. Samuel L. Gilson went to Mt. Pleasant, and a Mr. Miers and myself to Somerset. As we were using the wires of the Western Union Telegraph Company, the experimenting had to be done in the early hours of the morning. Magneto telephones have but little power, and not much was accomplished. We did talk, but not satisfactorily. The immediate result, however, was that Fleming and Gilson were in danger of being arrested as escaped lunatics, for it could not be understood why two sane men, in separate rooms, would be howling, Hello! at four o'clock in the morning."

The Telephone During the Austin Flood.

In an article on the Austin, Pa., flood resulting from the breaking of the dam on September 30, some interesting details are given in *The Telephone News* regarding the part played by the telephone operators in warning the people of the danger.

Miss Kathleen V. Lyons notified the subscribers by setting the alarm automatically and then remained at the board and notified subscribers in Austin and Costello, a small town three miles down the valley.

Miss Lyons was the only operator on duty. She said that her first report of the breaking of the dam came from a man in a nearby house by calling over the telephone located there. The first thing she did was to call the large mill immediately below the dam. Several hundred employes were at work there and most of them owe their lives to the fact that Miss Lyons stayed on duty when the danger to herself was great. Then she began to call officials of the town, the fire department and others. She notified the proper ones to blow the whistle constantly—a generally understood warning to flee to the hills.

Miss Lyons states that it was about eight minutes between the time she received her first warning until she left the switchboard, and then she left it only when she saw a church steeple, a block away from the office, topple and fall into the street. She then left the switchboard and fled for her life up the side of the mountain. The water was actually at her heels.

Miss Margaret Manion, the chief operator at Coudersport, proved herself a heroine at the same time. When she heard of the trouble she called the trouble man and told him what had happened. He in turn told the operator to order him an automobile as he left the building. She did so, and notified every doctor and official that she could reach. In a few minutes every machine in Coudersport was headed at top speed towards Austin in an effort to render assistance.

At Galeton, about twenty miles northeast, when Mr. C. R. Shelly, plant wire chief, heard of the flood he obtained two telephone sets, rushed to the scene in an automobile and connected them to toll lines. Mr. C. E. Lovell, the local agent, later received orders from the company's officials and permitted survivors and others to call up their friends at out-of-town points to state that they were safe.

The telephone company, in recognition of the heroism displayed by the Austin operators, rewarded them by presenting Miss Lyons with $250 and a watch suitably engraved; Miss Lena Binkey, chief operator, $100, and Hazel Knapp $50.

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Some Recent Developments in Railway Telephony.

Some interesting and valuable facts were brought out in the discussion which followed the reading of the paper of Mr. Gregory Brown on "Some Recent Developments in Railway Telephony," at the Los Angeles, Cal., meeting of the American Institute of Electrical Engineers.

MR. KEMPSTER B. MILLER said:

The matter of railway train dispatching, discussed by Mr. Brown in his paper, is one of great importance, not only to telephone men, but to railway people and the public at large. There is an impressive mileage of railroads, important railroads, that are now being operated by telephone rather than by the telegraph, and this fact is surprising to those who have not watched and been in close touch with the development of this branch of telephony.

An interesting thing in the discussion of the power transmission papers, day before yesterday, was that some companies had seen fit to build a separate pole line for the telephone circuit, distinct from the power transmission line. That is not because it is impossible to put telephone wires on transmission poles and get fairly good service, but in order to effect an extra precaution to insure telephone transmission at the time it is most needed. In many cases that is not done—I should say in the great majority of cases. Now, if the power transmission companies are, for added security, willing to build a separate pole line for telephone circuits when they already have a high grade line, the question naturally arises in my mind in regard to this telephone railway train dispatching, is it wise for the railroads to load up the talking circuit with the selective ringing apparatus? I see no reason for even suggesting the building of another pole line in the case of railway circuits; but it does seem to me that in many cases the building of a separate copper circuit, or iron if the conditions warrant iron, for operating the selective bells would be warranted. This separate circuit for the operation of the selective bells on the dispatching system, would prevent loading down, with ringing apparatus, a circuit already overloaded with a multiplicity of bridged talking circuits. I understand that some railroads are doing it, but that many others have refused to spend the necessary amount of money. In view of the extreme importance, particularly from the standpoint of the safety of the public, I think this phase of the subject worth discussion.

MR. L. B. CRAMER: I have noticed, in regard to the ringing of the bell at the station called, the sending keys are made of such a size, that if they were made a little larger they would not make a cabinet of extremely large dimensions, and the amount of space that can be given to them would then be enough to produce a ring long enough to call the operator. I notice our dispatcher often calls a second and even a third time. In case of substations, where the bell is mounted on a booth, there being some noise in the machines, we have an auxiliary bell that makes plenty of noise and the substations are the stations from which we get the best responses.

In regard to the switches, which have one position for receiving and one for transmitting, I have already thought of making some changes in the apparatus because in stations where we have a set that is mounted on a desk, about the second or third day after the telephone is in operation, the agents get a ruler or a stick and plug the button. This, perhaps, could be made a subject of discipline and, taken care of in that way, and you could get the result which you are supposed to get by being able to hear better by leaving the button in normal position and only press the button in when you are talking. The agent and operator will do these things and when there is a train coming, or anyone whom they think will see it, they will take the plug out; but ordinarily they will leave it plugged up so when they want to O. S. a train, they will not have to work the plug.

MR. RALPH W. POPE: Mr. Chairman, there does not seem to be anyone here to take up the telegraph operators' view of the situation.

Now it has been my experience in my fifty years of knowledge of the Morse telegraph, that the people who do not understand it and work it don't appreciate what a beautiful and simple method it is of transmitting communications. It may be of a little bit of interest—to add a personal touch—if I tell you that years ago, having some fifty pages of what would now be fifty pages of typewriting, to copy, and several manifold copies to be made, that Mr. Edison, my brother, one other operator and myself took turns in sending and then copying down from the sounder. We did that because it is an easier way to copy it from the sounder than by looking from one page to another. You simply write and the words go in your ear and go out of your pen or pencil onto the paper and that becomes so automatic that in the course of receiving a long press report, as we did during the Civil War, the operator was obliged to take a bunch of carbon paper and change the sheets at the bottom of each page so as to pick up the work when a new batch of sheets were ready, and this involved keeping behind about fifteen words, behind the sounder, and it took all of the next page to catch up with the sender. I am giving you this as an instance of what the telegraph system really is. Now, we take the way station of a railroad and the operator always has to look out for baggage and various things around the place and wherever he is in that room, no matter whether he is called or not, he knows what is going on over the wire. Of course, if he is called, he is obliged to answer. As an instance of what an operator can pick up in that way, I went down from Great Barrington, to Sheffield, expecting to ride back on the passenger train. It was bulletined on the telegraph board "No Report." I thought I could get to Great Barrington for dinner, but I could not find out whether I could and I sat there waiting to get my lunch, growing hungrier all the time. Meanwhile I heard a message going over the line that the train had been delayed, and that they would meet at Canaan somewhere below, and so on: and I fig-

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ured out it would be an hour and forty minutes before the train would be along. So I went to the operator and said, "How late is your train going to be?" He said, "I don't know; I have had no report of it." I said to him, "According to the information I received, they are going to meet at Canaan, and it will be about an hour and forty minutes wait, and I thought I would have time to go out and get my lunch." "Well," he said, "you are a pretty good guesser."

Perhaps what we may call that particular qualification of the telegraph would not appeal to the railroad management, that a man outside could find out how the trains were running. The point I am endeavoring to make in this is, that the Morse system is available to that man wherever he may be walking around the place. He has not got to go and answer a call and put a telephone up to his ear and drop everything else; but he takes that incidentally with his other work. That is simply one of the features of the Morse system that appeals to the railroad telegraph man. You must remember also that a great many of the men who are in active management are practical Morse operators, have grown up with the system, and know what it can do. This question has been discussed before several conventions of the Railway Telegraph Superintendents. So you will see that there is another side to the question. Here you have a railroad force developed from telegraph operators who are familiar with a system of this kind, and it is the simplest and best thing that appeals to us in carrying on this work. Were a sounder there, I can receive a message sitting here, and I don't have to hold anything to my ear at all. I simply sit down and write from it, and where a man has grown up with it and is familiar with it, he never can get over that love and appreciation of the simplicity of the Morse telegraph system as known to the one who has practiced it, although it is now thirty years since I have done so.

MR. K. B. MILLER: I can add my little personal touch there, although a much less skilful operator than Mr. Pope was, and having no right to claim to be an old timer, that it is much easier for me, or would have been in days gone by, to have written down matter taken from a sounder than to get it by telephone. Mr. Pope's remarks suggest a distinct need in railway train dispatching. Some way may be evolved of relieving the dispatcher, who is a rather important man, from wearing a harness—I refer to the head telephone. They don't like to do it. The loud speaking receiver has been proposed and tried out rather carefully, and so far as I know has failed. One very ingenious way has been proposed and tried, but has not met with good results owing to poor articulation. It is to use at the dispatcher's station a telephone repeater so that the feeble incoming currents could be magnified to produce loud talk in the receiver, and thus relieve the dispatcher of the necessity of listening to a receiver held to his ear. This produced plenty of noise, but it is articulate speech rather than noise that railway train dispatching needs.

MR. RALPH W. POPE: I might add to my remarks that the conditions which I spoke of in regard to the railroad service have changed very much within my recollection. When I entered the service, the station agents knew nothing about the telegraph, so in order to have telegraph facilities, the railroad was obliged to have an operator in addition to the agent, so that today we have this different state of affairs where the telegraph operator has grown up to be the agent, and the agent therefore is not necessarily obliged to have an operator at his station, on his staff. This means nothing in large stations where they have several employes, because there is enough work to keep the operator busy; but in small stations it simply means that one man, by his knowledge of telegraphy, his knowledge of railroad work, can be the whole thing.

MR. GREGORY BROWN: Mr. Miller brought up the question of separate signaling circuits. There is one type of selector, so far as I know, that uses three wires—one for signaling and two for talking. That has not been very extensively used. When you consider the impedance of the selectors across the line, it hardly seems necessary to consider that line very heavily loaded as far as transmission is concerned. For that reason, I do not believe it would be necessary to have a separate signaling wire. Selectors are also being experimented with now that have an impedance of something over 600,000 ohms. These selectors contain advantages due to that high resistance, and if they are used, it certainly would not be necessary from a transmission standpoint to have an extra signaling wire.

Mr. Cramer seems to have had quite a few troubles. The first he mentions is that he does not find it feasible to signal and talk at the same time. I have been around pretty nearly all over the country on the various roads, and this is a complaint that is practically new to me. In some cases I have found this to occur, but on investigation we generally find that there is some trouble with the dispatcher's apparatus. One of the troubles that occurs perhaps more than any other and causes these results is the breaking down of the condensers at the dispatcher's office. These would not round off a sending wave to such a great extent.

The length of ring has been criticized—the length of ring at the station. I have gotten around that, where they want a longer ring, by installing a strap key at the dispatcher's office. This key is wired in parallel with the automatic keys, and if the dispatcher, for any reason, wants the bell in the station he is calling to ring longer than would ordinarily be the case, he turns the calling key of that station, and when he hears the answer back he merely presses down the strap key. There are various other modifications of selector arrangements which permit the bell to ring in the substation until the substation operator presses a button. In fact, most any kind of service can be given, according to what the particular railroad wants, but, as a general thing, most of them are satisfied with a certain length ring, about a second and a half, uniformly in all stations.

Another trouble that was experienced was that the agent sticks a toothpick or something in the push button and holds it down. The obvious plan to pur-

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sue there is to dismiss the agent; and this has been done in a great many cases, especially when the telephone was first used on railroads. As has been mentioned by several of the speakers, the operators objected a good deal at the introduction of the telephone, their idea being that they probably were going to have their salaries reduced ,or some of them would lose their jobs. It is not the policy of large railroads to put men out of employment except in very extreme cases, and if the introduction of the telephone permits offices to be closed, or forces to be reduced at certain points, the men as a rule are taken care of in some other position.

Mr. Bennett spoke of calling and selecting on transmission lines. Mr. McMeen answered this question about the only way it can be answered, I guess, and that is with proper transpositions of your line if you get a quiet telephone line you can do anything with it in the way of talking and selecting.

Mr. Pope brought up the point in favor of the telegraph in that you could hear the telegraph when you were at some distance away from the instrument, whereas in the telephone you have to have the instrument up to your ear. About two months ago I conducted a trial installation down on one of the Pennsylvania lines, using a new type of loud-speaking receiver. Criticism has been made of the telephone when used on a railroad division that it was all right for every purpose except blocking, and that for this purpose it was not as quick as the telegraph, and this criticism seemed to be more or less justified. The reason that this criticism was made was that in telephone blocking it is necessary for the operator to ring up another operator and then go through the motions of putting the receiver on his head and talking with him, whereas with the telegraph he merely ticks off what he wants to say and it is done. And that was the reason for the development or the experiments with loud speakers of various kinds and the attempt to develop a good one.

There has been considerable work done on this, and, although it has been comparatively easy to get up a loud speaker for blocking—one that was plenty loud enough—still the articulation was not what it should be. This blocking service represents an ideal condition for loud speakers, because the lines are extremely short and are not loaded, and you can take full advantage of all the energy coming out of the transmitter. This installation was put in in three or four of the towers, and was left in for about ten days. During that time it was used exclusively by the operators for blocking trains, and in fact they much preferred to use these speakers because the work was easier for them. They were then taken out merely to put them in in a better shape the next time as far as mounting is concerned, making it more convenient for use, and also to employ a busy test by means of a buzzer that had not been taken care of in the first installation. It is intended to use or experiment with this same type of receiver for dispatcher's use, and there will shortly be some trials in that field.

Mr. Elwell spoke of a train dispatching line being in use in Australia in 1902, I think it was. In the first part of my paper I mention two or three instances of the early installation of telephones on a train wire. All these installations used code ringing, and for that reason they were not very successful. There was too much of a load on the dispatcher. I think the first one used in this country was in 1883, which is probably before the one mentioned by Mr. Elwell.

I think there is no doubt that the telephone has proven its case on the railroad, and I mention in the paper quite a few advantages of the telephone over the telegraph and I can probably mention quite a few more, and anybody who thinks of the matter can easily see that there is no question but what the telephone does have advantages over the telegraph. Mr. Miller, I believe, raised the point about the distinctness with which the intelligence could be transmitted over the telephone—that is, where train orders, important orders regarding train service in which human life is risked—the distinctness with which they could be heard. Now, in sending out orders, the various railroads have standardized, in their telegraph methods, and they have also adopted practically the same scheme when they shifted over to the telephone. In sending out an order the despatcher rings the various operators and they will come in and then he states a certain number, 31 or 23, or whatever it is, which indicates the type of order he is to give and he starts to give his order, and as he gives his order he writes it down himself so as not to give the order faster than the operator can take it down. As the dispatcher writes the order when he comes to the name of a town or any figures whatever, engine numbers or anything similar, or the time, besides speaking it in the ordinary manner, he spells it out. After he has completed giving the order the operators in their turn repeat this back to him and as each operator repeats it back to him the dispatcher underlines the word repeated, so if there are three operators repeating the record of the order would be in the dispatcher's book—it would have three underlines under each word which was repeated, which would supposedly prove it had been repeated by three operators.

A telegraph manager in a western city, who recently purchased a copy of "Telegraphers of To-day," expresses his delight with it. He writes: "It is a splendid record of the telegraphers of almost 20 years ago, and the excellent portraits of those who figured in the telegraph at that time make a book of great value and a work of reference in these later days."

Copies of this book may be obtained of TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York, at $1.00 per copy, express charges collect.

Every one connected with the telegraph and telephone services should read Telegraph and Telephone Age. Its columns contain the latest news in these fields.

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International Telegraph Monument.

We have received from the Bureau of the International Telegraph Union, Berne, Switzerland, a photograph of the model of the monument which will be erected at Berne to commemorate the founding of the International Telegraph Union. The photograph is reproduced herewith.

The monument was designed by M. Romagnoli of Bologna, Italy. It is of bronze and stands on a stone foundation.

In conception it represents all parts of the world connected by telegraph, and in the design this sentiment is portrayed as a whole rather than by depicting the individual races.

The central figure shows the spirit of telegraphy and the Union is expressed by the joining of hands with the figures at both sides.

On the two tablets are engraved the names of the twenty original states which founded the Union, and at the back of the monument there is a blank tablet for a more ample description should it be desired at any further time.

MONUMENT TO COMMEMORATE THE FOUNDING OF THE INTERNATIONAL TELEGRAPH UNION.

Wires and insulators are shown to add character to the design and as an evidence of the conception.

The monument is very symmetrical, and the two blocks of stone on either side of the approach are designed to harmonize with the surroundings at the point where the monument is to be erected.

The overall dimensions of the monument are 59 feet in diameter and 19½ feet high.

The first international telegraph convention was concluded between certain central European states on June 29, 1855.

At the Paris conference in 1865 these gatherings were placed on a more systematic footing, and at the Rome convention in 1871-72 the submarine cable companies were first represented.

At the conference in Libson, Portugal, in 1908, it was proposed that the jubilee of the conference be commemorated by the erection of a monument at Berne, Switzerland, which proposal was agreed to by the respective governments.

The next convention will be held in Paris in 1915.

Short Period Telephone Service.

Appreciating the needs of the business man for regular and efficient telephone service between the home office and branches, the American Telephone & Telegraph Company devised a plan for furnishing regular daily periods of service at reduced rates, with all the features of the private wire contract for all day service.

That the plan has been exceptionally interesting to the larger users of long distance service is evidenced by the fact that numbers of them have adopted the "Short Period Service," as it is called, and find that in addition to decreasing the cost, it systematizes the telephone end of their business.

The periods offered subscribers are from 30 minutes daily up to the full business day of 10 hours, and a recent new departure occasioned by the demand, is the dividing of a 30-minute period into two 15-minute periods, thus enabling a subscriber to contract for 15 minutes' service both in the morning and afternoon.

The Short Period contract must be made for some period before 10.00 o'clock in the morning, after 4.00 o'clock in the afternoon or during the noon hour.

The price varies for different periods and different distances, but is attractive because it is a monthly regular service, and has a stated time price for traffic that can be handled more economically than can emergency messages.

The contract provides for an absolutely private wire and all of the operating is done by the subscriber. There is no placing of the call with the operator, no waiting for the connection to be made and no three-minute rate. The wire is there at the stated period, placed at the disposal of the subscriber for instantaneous communication with his branch office.—*Telephone News.*

Receiver for a Telegraph Company.—It is announced that the Consolidated Printing Telegraph Company, with headquarters at Newark, N. J., has gone into the hands of a receiver.

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The New Buffalo Office of the Postal Telegraph and Cable Company.

BY J. P. O'DONOHUE, DIVISION ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

On Sunday, August 27, the Postal Telegraph-Cable Company took possession of its new quarters at Buffalo, N. Y.

The new office is stated to be the finest telegraph office in the country in point of equipment and attractiveness, and many new ideas and improvements are noted. Among them may be mentioned the electric lighting; the call circuit cabinet: the messengers' uniform room; bath rooms for the boys; the switchboard equipment; the use of flameproof wire; separate fusing of potential leads; use of Edison street current for main and local circuits, etc. It occupies portions of the first, second and sixth floors and basement in the Prudential Building at the corner of Church and Pearl Streets.

FIG. 1.—GENERAL VIEW OF THE BUFFALO OPERATING ROOM.

There are two large illuminated signs fitted into recesses in the building and reading: "Postal Telegraph-Cable Company." The letters are made of translucent blue and white glass, and the frames are covered with ornamental hammered copper. Tungsten lamps are used to illuminate the signs, which present a beautiful appearance by daylight and are even more attractive at night.

Supplementing the signs are two trade-marks and two "messages," each four feet wide, painted alternately on four of the large plate glass windows. The fifth window is lettered with a "cable" panel.

The receiving, cashier's and delivery departments and manager's office are located on the ground floor and are elaborately furnished throughout. The counter is of Tennessee marble and is surmounted by a cast bronze grill of beautiful design. The office furniture and trim are of mahogany and harmonize with the deep olive walls and cream colored ceiling. In the inner offices the mosaic floor is covered with rugs. The lighting is supplied by seven five-hundred-watt tungsten lamps suspended twelve feet from the floor.

The call-circuit cabinet, equipped with twenty-eight circuits, and two telephone exchanges, carrying nine trunk lines and eighteen extensions, are also upon this floor.

In the basement are located the terminal room, supply room, line department and the messengers' uniform room; also two one-horse-power motor blowers which are used to operate the pneumatic tubes connecting the different departments.

The terminal room is built of fireproof material and is equipped with four hundred porcelain terminal blocks mounted on an angle iron frame. The messengers' uniform room is quite unique, being made entirely of iron grill work. This construction in addition to being non-inflammable is highly sanitary as well as insuring proper ventilation. Adjacent to the uniform room is a shower bath for the boys and lavatories for the ground floor employes.

On the second floor are the operating and bookkeeping departments, a retiring room for the women and locker and smoking rooms for the men.

The operating department occupies the southern wing and is finished in oak with buff walls. The switchboard equipment consists of an angle iron switch frame with sheet iron panels divided into three sections holding two fifty-wire main line boards carrying eighty wires and a legboard with a capacity of two hundred spring jacks. Under each main board are located two rows of fifty and one row of twenty-five pin jacks, while under the legboard there are four rows of fifty-pin jacks. These jacks carry all the local circuits from around the room, the transfer loops between sections, and the branch office loops. All of this equipment is mount-

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ed on slate. The iron frame work and panels are stained and grained oak to match the furniture.

In the rear of the switchboard are the terminal frames. These frames, as well as the switchboard frame, are as near fireproof as it is possible to make them. The frames of angle iron are equipped with three hundred porcelain base combination fuse blocks and arresters, twenty-two hundred cross-connecting terminals mounted on slate bars, and

FIG. 2.—REPEATER RACKS AND MOTOR GENERATORS.

eight hundred Ward Leonard resistance coils. Flameproof wire is used throughout upon the frames. All main line wires are protected with half ampere two-thousand-volt fuses and arresters, with ten-mile separators.

One of the most interesting features of the office is the new type repeater table, which was described and illustrated in the September 16 issue of TELEGRAPH AND TELEPHONE AGE. There are two banks of sixteen sections each and one bank of twenty sections, equipped with thirteen quadruplexes twenty-two duplexes, six main line repeaters and three half repeaters.

FIG. 3.—VIEW OF PUBLIC RECEIVING ROOM.

The fourteen quartette and one sextette operating tables provide sixty-two sittings which are wired for eighteen flip-downs, twenty-seven main line sets, ten annunciators for short wires, two quadruplexes and a phantoplex set. Postal standard extension arm resonators are used on all tables. The asbestos-lined wiring cabinets at the end of each bank of tables are placed directly over cement hand holes, fitted with sectional castings which are removable when it is desired to obtain access to the hand holes.

All potential leads and cables under the floor are run in inch-and-a-half black iron pipe. The cable used consists of twenty-six pairs of No. 19 B. & S. twisted silk and cotton insulation, lead covered. The potential leads are of No. 6 B. & S. rubber insulation, lead covered, and No. 12 B. & S. twin, rubber insulation, lead covered.

The room is divided into four sections, the potential leads for each section being fused separately so as to avoid complete interruption to any of the leads in event of an accidental short-circuit.

The generator plant consists of eight motor-generators with 110-volt primaries. Three five-horse-power Crocker-Wheeler 385-volt machines furnish current for the quadruplexes and three three-horse-power Crocker-Wheeler 200-volt machine for use in Wheatstone measurements and a 150-volt alternating current machine for phantoplex work.

Directly above the machines are the switches, rheostats and voltmeters upon slate panels. Back of the panels bus-bar construction is employed and all starting boxes are equipped with no-voltage release attachments.

The primary power is supplied through special leads from the Buffalo General Electric Company's mains by a three-wire direct current system, 110 volts on each side, with the neutral grounded. The motor load is divided equally between the two sides. Special leads from the building plant are provided for emergency use in case of interruption to the regular supply of current. The current employed at the main board is taken directly from the 110-volt mains through resistance coils, as is likewise all current for local circuits. Two-thousand-ohm coils and 150-ohm instruments are used on all such circuits.

FIG. 4.—VIEW OF OFFICE EXTERIOR.

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Another new idea which has been worked out in this office is the local signaling system which permits an operator to call in the repeater chief on his circuit without delay in case of an interruption. This is accomplished by means of cam switches located at the operating tables controlling lamp annunciators at the multiplex sets.

The room is illuminated by thirty 100-watt lamps with holophane shades, giving a uniform distribution of light without shadows.

The chief operator's desk is located upon a raised platform and commands a view of all sections of the room.

In the northern wing of the building are located the bookkeeping department, women's rest room and the locker and smoking rooms for the men.

The superintendent's offices are on the sixth floor and are fitted up and arranged with modern equipment.

The staff of the Buffalo office consists of Messrs. Harvey D. Reynolds, district superintendent; C. H. Newman, manager; J. W. Sullivan, chief operator; E. S. Washburn, day wire chief; J. F. Harrington, day repeater chief; Nathaniel Hucker and W. O. Weydman, day traffic chiefs; J. B. Slocum, night chief; George A. Cross and George W. Thrall, night traffic chiefs; Wm. A. Moran, all-night chief.

Telephone and Telegraph Practice in England.

Mr. Angus S. Hibbard, of the American Telephone and Telegraph Company, New York, is the author of an article in the *Postoffice Electrical Engineers' Journal*, London, entitled: "Some Observations on Telephone and Telegraph Practice in England."

Mr. Hibbard visited England last Spring to look into the workings of the telephone and the telegraph, where the two systems were operated together to transmit or receive telegrams, and he found in the routine and manner of working much that was interesting and instructive. Telephones, he states, are successfully used instead of telegraph instruments in handling telegrams at branch offices, the telephone being generally preferred by the staff employed at nearly every office he inspected.

"The telegraph concentrators were most interesting," says Mr. Hibbard, "and their application, as I saw them, excellently worked out. The greatest delay in handling telegrams is no doubt caused by the prevailing use of code addresses, making reference to books of code words necessary before telegrams can be delivered. This delay under the present systm seems unavoidable, but it must cost fully as much as the sum received annually for the registration, and involves the greatest delay experienced in any part of the telegraph system. I am sure I should prefer the American plan of free addresses, especially when telephone addresses are used, making immediate delivery by telephone possible. The number of telegrams between two points in London, while decreasing on account of the more frequent use of the telephone, still seems very great. Telegrams costing a shilling or more, which could be telephoned direct for twopence, are still in evidence. The adoption of a telephone address, recommended by the Committee investigating telephone deliveries, will do much to speed up a considerable porportion of the London service."

The Anglo-Belgian Loaded Telephone Cable.

One week after the Anglo-Belgian loaded telephone cable was laid a fault occurred, which was localized at a point about 2½ miles from St. Margaret's. Repairs were effected in about 12 hours, and the fault was found to be due to a bad joint between one of the cores and the insulation of the coils. The short time required to remove this fault, which naturally included the inserting of a new set of coils, shows that there is no difficulty in repairing this class of cable.

The cable differs from the one laid between Abbott's Cliff and Cape Grisnez, which is still in perfect condition in so far as special loaded coils have been introduced, which enable a superimposed or "phantom" circuit to be worked, in addition to the two ordinary loop circuits.

Following are some interesting details of the "constants" of the **new cable:**

Resistance per nautical mile of loop conductor without coils.	14.2 ohms at 15° C.
Capacity per nautical mile of loop conductor without coils.	0.157 mfd.
Capacity per nautical mile of phantom circuit without coils.	0.314 mfd.
S/K at 800 cycles per sec. and 15° C., and is not proportional to frequency.	12
Self-inductance of the coils for the transformer circuit.	0.1 henry.
Ohmic resistance of the inductive and non-inductive coils in the transformer circuit.	6.6 ohms.
Effective resistance of the inductive and non-inductive coils of the transformer circuit at 800 cycles with 1 milliampere at 15° C.	11.5 ohms.
Self-inductance of the coils in the phantom circuit.	0.05 henry.
Ohmic resistance of all coils in the phantom circuit.	3.3 ohms.
Effective resistance of all the coils in the phantom circuit at 800 cycles with 1 milliampere at 15° C.	4.6 ohms.
Capacity of the coils in the transformer circuit.	.004 mfd.
Additional capacity of the coils in the phantom circuit, less than	.0001 mfd.

The cable was manufactured and laid by Siemens Brothers & Co., London, England.

Glass Telegraph Poles.—Glass telegraph poles are manufactured in Germany. The glass mass whereof these poles are made is strengthened by the interlacing and interwining with strong wire threads. It is asserted that the glass poles show their superiority over wooden ones by reason of their resistance to the ravages of insects in tropical countries and against the climatic influence or rain, snow and sleet in other countries.

It is the general opinion that TELEGRAPH AND TELEPHONE AGE stands at the head of periodicals of its class. Every telegrapher and telephonist should be a subscriber.

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Insulating Materials.*

Insulating materials may be classified into distinct groups as follows, according to the nature of the material:

(1) Stony materials, such as slate, marble, mica, asbestos and porcelain.

Slate is an excellent insulating substance for use as terminal boards, provided it be free from metallic veins. It is non-combustible, easily broken, but tougher than porcelain, and is liable to absorb moisture unless varnished. It is improved by being boiled in paraffin. Its insulation resistance per mil. thickness for one square inch cross-section is 0.5 megohm.

Marble is an excellent insulating substance, and is tougher than slate, as it is not so liable to be affected by moisture, although it is readily affected by some acids. It is non-combustible, but it begins to conduct like an electrolyte at temperatures near to a red-heat.

Porcelain is a good insulating substance for bases, supports for terminals, and for insulating bushes. It is, however, brittle, and if subjected to much strain, easily broken, consequently care is required in fixing porcelain insulators. It is non-combustible, but, like marble, it begins to conduct as an electrolyte at temperatures near to a red-heat.

Mica is an anhydrous silicate of aluminum and potassium or soda, found as deposits in India, Canada and the United States, the best quality for electrical purposes being obtained from India. Its specific resistance is very high, being 30,000 megohms per square-inch-mil. It withstands high temperatures readily, and is particularly well adapted for use in electrical machines, as it powerfully resists penetration or puncture by a spark, the best qualities being able to withstand 5,000 or more volts with a thickness of one mil. It, however, lacks flexibility and uniformity, and tends to permit surface leakage. It is extremely useful as a component of artificial insulating compounds, such as micanite, mica-canvas, mica-long-cloth, megohmite.

Micanite is formed by cementing together thin laminæ of mica by special gums (i.e., pure shellac), and insulating cements under high pressures and at a high temperature. At normal temperatures its specific resistance is 1,000,000 megohms per square-inch-mil, but when the temperature exceeds a certain value (above 150 deg. C.), the cement suffers chemical decomposition, and if the voltage to which it is subjected for a given thickness is gradually increased, a point is reached at which it loses its insulating quality and is traversed by a current which heats it up and burns it, rendering it defective as an insulator. It may be bent into suitable forms when heated.

Mica-canvas is formed by cementing scrap sheets of mica about 2 mils thick between two sheets of canvas, so that the strips of mica overlap one another, and when the total thickness is about fifty mils, and has been baked in a steam-heated oven for twenty-four hours, it will withstand a pressure of 3,000 volts (alternating). Its specific resistance per square-inch-mil is 300,000 megohms.

Mica-long-cloth is made in a similar manner by cementing scrap mica between very thin linen fabric to a thickness of twenty-five mils., and its specific resistance is 300,000 megohms per square-inch-mil.

Megohmite is also a mica composition, whose specific resistance is high, and which can readily be molded.

Asbestos has a specific resistance of seven megohms per square-inch-mil. and withstands high temperatures readily. It is weak mechanically and readily absorbs moisture.

Vulcabestos is another insulating compound which consists of asbestos cemented together with a small quantity of rubber and vulcanized, and as it retains its insulating qualities at temperatures as high as 300° C., and may readily be molded it is a very useful product. Its specific resistance is fifteen megohms per square-inch-mil.

Ambroin is formed by mixing fossil copal and silicates by a special process, which enables a strong, firm, uniform, durable, and non-hygroscopic material to be produced. As an insulator it is cheaper than ebonite, and withstands high temperatures better. It is also easily worked.

(2) Resinous type, including shellac, all kinds of resin, copal and other gums.

(3) Bituminous type, i.e., bitumen, asphaltum and pitch.

(4) Wax type, including beeswax, solid paraffin and ozokerit.

(5) Elastic type, including india-rubber, natural and vulcanized.

(6) Oils.

(7) Cellulose, including dry wood and paper, cotton and various preparations.

(8) Silk and animal tissues.

(9) Sulphur.

Bitumen is an excellent insulating material, and is very inert. It melts at a comparatively low temperature, and flows freely at a little over 100° C.

Paraffin wax increases the insulating resistance of fibrous materials, but is easily melted, and is very inflammable. When mixed with linseed oil it forms an insulating material of high disruptive strength.

Shellac and resin, and varnishes containing shellac and resin, are valuable insulating substances, but they give off vegetable acids when heated, and these are found to corrode copper.

India rubber, or simply rubber, is used extensively in the manufacture of cables on account of its high dielectric strength and insulating resistance. It is obtained from a great variety of trees and shrubs in the form of a milky sap which is coagulated by heat, and then forms raw rubber. The finest and best quality is that known as Para rubber, which comes from Brazil. When rubber is heated and mixed with sulphur, part of the hydrogen (its composition being C_5H_8) is replaced by sulphur, and the product is termed vulcanized rubber, a flexible, elastic body also extensively used as the insulating envelope of cables. Pure rubber is expensive, and it deteriorates in time if subjected to moisture, whilst

*From *Electricity*, London.

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vulcanized rubber oxidizes more or less rapidly and absorbs water to some extent. When rubber is mixed with a high percentage of sulphur and vulcanized for a considerable time, a hard horny substance known as vulcanite, is formed, which is largely used for bases and supports of terminals and instruments.

Telegrams by Telephone.*

On March 1, 1911, 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. Since that time, with the co-operation of the Western Union Telegraph Company, a steady advance in the handling of this service has been made.

It is not necessary for the public to look up the telephone number of the Western Union. The word "Telegram" is used instead of a telephone number, and central office arrangements are perfected which insure the connection of the telephone to the proper Western Union office.

Every one of the 10,874 telephone operators in the 518 central offices knows what to do when she hears the magic word "Telegram" at any hour of the day or night from anyone of the 768,448 telephones served by the New York Telephone Company. Every telephone station is a telegraph station. The telegraph operators take the messages from dictation over the telephone lines. The charges for telegrams are being billed and collected by the telephone company. Subscribers are beginning to look on a telegraph message as a familiar incident of every-day social and business communication rather than as a serious and special event.

The old tendency to think of telegraph blanks and messenger boys as an essential part of the machinery for starting a telegram on its way, or for receiving a reply, will soon be a thing of the past, and the feeling of alarm which thousands of persons of nervous temperament have suffered at the receipt of the yellow telegraph envelope, fearing that it may be the bearer of bad news, is rapidly disappearing as people generally avail themselves of the wonderful convenience of the telegram, the day or night letter, and the cable message as a means of communicating good news and intelligence of all kinds to their friends and business associates. The receipt of the telegram or day letter by telephone will be quite as commonplace an event as the receipt of the social or business letter or telephone message.

Every advertisement has brought an increase in the volume of telegrams handled by telephone. A recent circular enclosed with the telephone bills increased the number of telegrams received over the telephone at the New York office of the Western Union Telegraph Company 60 per cent.

This great added convenience is not limited to subscribers of the company, as the routine provides for receiving telegrams from all public telephones. When telegrams are sent from coin box telephones of the multi-coin type the Western Union operator advises the telephone operator of the amount of telegraph toll, the telephone operator in turn asking the patron to drop the money for the telegraph message in the coin box, together with the charge for the telephone call. Special placards are being placed at these stations explaining the service.

At most of the important public telephone stations equipped with switchboard and booths where the company employs an attendant to handle the business, arrangements have been made to receive written telegrams from the public for transmission, the telephone attendant, as the representative of the telegraph company, collecting the toll and telephoning the message to the nearest Western Union office. This feature has made available to the public eighty-one additional places in and around New York City alone, at which Western Union telegrams and cable messages of every sort may be handed in over the counter.

The telephone company is trying in every way to encourage subscribers and patrons to give the telephone number of the person to whom telegrams are to be sent. Experience has shown that telegrams can be delivered by telephone, in a large majority of cases, without any of the delay incident to the delivery by messenger. Here, again, the public seems to be pleased with the new arrangements. The delivery by telephone incidentally does away, in many cases, with messenger charges.

Attention is being given to the plan of combining commercial offices of the two companies. A number of these joint offices have been established in the up-State divisions. The extension of this arrangement to a large number of other places in the territory is being actively pushed by both companies with every probability that a suitable working arrangement can be effected which will result in increased convenience to the public.

As an instance of the efficiency of the new telephone and telegraph service a case is cited where a telephone subscriber in New Rochelle, N. Y., transmitted a cable message to London over his telephone and received a reply over the telephone without having left his office chair.

Telephone Service on the Isthmus of Panama.—A contract has been entered into between the Panama Railroad Company and the Isthmian Telephone Company, a local corporation organized for the purpose of conducting a general telephone business on the Isthmus of Panama, by which the railroad company will transfer its commercial toll-line business originating at Colon or Panama to the telephone company. The telephone company will at once establish its toll-line service, using the railroad company's circuits out of Panama and Colon. The contract does not include the whole Canal Zone in its scope, and the present arrangement of charging $7.50 a month for commercial service will be continued at all intermediate points.

*From *The Telephone Review*.

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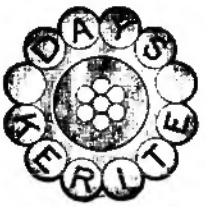

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The Railroad.

Mr. G. H. Corse, Jr., representative of the Chicago, Milwaukee & Puget Sound Railway in Shanghai, China, has resigned to accept a position in the telegraph service in New York.

Mr. Wilmer S. Bates, night chief of the Northern Pacific Railway, at Seattle, Wash., has resigned, to go into the ranching business in the White Salmon Valley, Washington. Mr. Bates, however, has not become separated entirely from telegraph interests, as he has established a wireless station at his home, by means of which he will keep in touch with the outside world and receive the news of the day.

Mr. E. E. Backus, superintendent of telegraph and signal engineer of the El Paso and Southwestern system, at El Paso, Tex., whose appointment was announced in our issue of September 16, is a native of the Old Dominion state (Virginia), having been born February 10, 1868. In 1883 he began his telegraphic career in New York, and has had a wide experience as a telegrapher and official with telegraph, telephone and railway companies and commercial concerns. At the time of his last appointment he was sales engineer of railroad supplies of the United States Electric Company in its Chicago office.

Telephone Dispatching on Florida East Coast Line.—The Florida East Coast Railway is installing a telephone train dispatching system on its line.

The Burden of a German Telegraph Inspector.—If any one should have occasion to communicate with the assistant inspector of the telegraph department of state railroads in Germany, he should be addressed as the "Eisenbahnbetriebstelegrapheninspektionasistenten."

Meeting 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 November 23 and 24 to consider matters of interest and importance to the telegraph-telephone branch of the railway service. The practice of handling Western Union reports and other similar business between railroad offices and the telegraph superintendent by railway mail having been objected to by the Post Office Department the matter will receive consideration at this meeting. The members will visit the plant of the Kellogg Switchboard and Supply Company and that of the Western Electric Company at Hawthorne. Other matters of special and general interest will come before the Chicago meeting and a large attendance is looked for. Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railway, St. Louis, Mo., is the chairman of the Western Division, and Mr. Charles Selden, superintendent of telegraph and general inspector of transportation of the Baltimore & Ohio Railroad, Baltimore, Md., is the chairman of the Eastern Division.

Death of Isaac T. Dyer.

Isaac T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake City Railroad, Los Angeles, Cal., died in the hospital in that city on October 25 after a lingering illness. He was one of the most prominent and popular railway telegraph superintendents in the country and endeared himself to a large circle of acquaintances through his sterling qualities. He was elected president of the Association of Railway Telegraph Superintendents at the Los Angeles meeting in 1910 and served its interests faithfully and well notwithstanding his impaired health.

Mr. Dyer was born in La Grange, Mo., August 17, 1860. He entered the railway telegraph service in 1876, and two years later accepted a position with the Western Union Telegraph Company at Quincy, Ill., where he displayed considerable ability as an electrician besides being an expert telegrapher. He later filled positions in the Kansas City and St. Joseph, Mo., offices, and in 1889 reentered the railway service in Kansas City, on the Kansas City, St. Joseph and Council Bluffs Railroad. While residing in St. Joseph, Mr. Dyer became a prominent citizen of that place and was a member of the school board for a number of years. He accepted his late position about ten years ago during which time he resided in Los Angeles.

New Telephone Dispatching Circuits on Lake Shore Railway.

The Lake Shore and Michigan Southern Railway has placed another order with the Western Electric Company for enough of its selectors to equip five new circuits. The Lake Shore road is already operating about 1,100 miles of circuits by telephone, and the addition of the five new circuits will bring the total mileage up to about 1,850 miles. The new circuits run from Hillsdale to Lansing, Mich., with a branch from Homer to Dundee, Mich.; from Fort Wayne, Ind., to Jackson Mich., with a branch from Bankers to Ypsilanti, Mich. (thirty-six stations); from Detroit to Jackson, Mich., with a branch from Monroe, Mich., to Toledo, Ohio, and another one from Grosvenor, Mich., to Fayette, Ohio, with a short branch from this line at Lenawee Junction to Adrian, Mich. (forty-one stations).

In addition, a message circuit will be run from Fort Wayne, Ind., to Jackson, Mich., with twenty-two stations. Another message circuit will also be run out of Detroit to Jackson, with a branch off from Lenawee Junction to Adrian, Mich., and Fayette, Ohio (twenty-two stations).

Meeting of T. M. B. A.—The annual meeting of the Telegraphers' Mutual Benefit Association will be held at 4 p. m., November 15, at 195 Broadway, New York. An amendment to the constitution providing that past presidents shall be members of the executive committee will be voted upon and also an amendment making change in date of annual meeting.

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Magnetic Club Fall Dinner.

The autumn dinner of the Magnetic Club will be held at the Hotel St. Denis, New York, Wednesday evening, November 15. The officers and members of the executive committees of the Old Time Telegraphers' and Historical Association, and the Society of the United States Military Telegraph Corps, have been invited to attend the dinner as the guests of the club, and the following have signified their intention of being present: Hon. Wm. S. Jordan, of Jacksonville, Fla., president-elect Old Time Telegraphers' and Historical Association; Col. Wm. B. Wilson, of Holmesburg, Philadelphia, Pa., president of the Society of the United States Military Telegraph Corps; Mr. Belvidere Brooks, general manager Western Union Telegraph Company, New York; Mr. D. H. Bates, secretary Society of the United States Military Telegraph Corps, New York; Mr. Richard O'Brien, Scranton, Pa.; Messrs. C. A. Tinker and W. J. Dealy, general superintendent of the Commercial News Department, New York.

The out-of-town delegates to the annual meeting of the Telegraphers' Mutual Benefit Association, which is to be held on the afternoon of the same day, have also been invited to attend the Magnetic Club dinner.

Mr. Joseph J. Cardona, 253 Broadway, New York, is treasurer of the club, and all those who expect or desire to attend the dinner should communicate with him not later than November 11.

Our Subscription Contest.

The subscription contest is now waxing warm, and our agents are exhibiting great activity. New subscriptions are coming in in a satisfactory manner, but we desire a great many more before the contest closes. Every man in the telegraph business should be a subscriber and there is a large field yet to be developed by our agents. Each one will find in his own territory many persons who are not subscribers although they may be readers of occasional copies of TELEGRAPH AND TELEPHONE AGE. These should be singled out and argued with systematically and with judicious persistence. The strongest argument an agent can present to prospects is that the paper is educational and contains news and information that are worth many times the subscription price. Our instruction course in the elements of technical telegraphy, which began in the issue for October 16, is a technical education in itself, and could not be obtained for $25.00 elsewhere, yet this is given free to our subscribers.

The conditions of the contest were given on page 594 of our issue for September 1. There are five prizes, as follows: First, $50; second, $25; third, $15, and the fourth and fifth, $5 each. The contest is limited to new subscriptions and renewals only. The total amount received from each agent on this account will decide the contest. In the event of a tie on any one prize, the prize will be divided.

In offices where there is no regular agent for this journal an agency may be established by securing an appointment, and any reliable person can thus enter the contest. An agent in a small office has just as good a chance to win as has the one in a large office, and it is desired that many more new agencies be established. There are many telegraphers throughout the country who are not subscribers, but who ought to be for their own good and agents are urged to exert themselves to the utmost to capture them.

The contest will close December 20, therefore there is ample time for hustlers to enter the lists and make a record.

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.

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Mr. Edison's Explanation of the Incandescent Lamp.—Mr. Edison has a characteristic way of telling things he knows, and this was referred to recently by Mr. Walter P. Phillips of Bridgeport, Conn., an old time telegrapher and later general manager of the United and Associated Press. In 1876 Mr. Edison attempted to explain the incandescent lamp to a reporter of the "New York Times," F. X. Schoonmaker. "You see, Skooney," he said in his inoffensively familiar way, "the current is generated and is sent out on the wire just the same as it is for the arc lights. Finally, in my system, it strikes these lamps which have, inside the bulb, as near to a vacuum as we can get. You know nature abhors a vacuum and mighty mean of her, too, for if the vacuum were perfect we would never have to renew our lamps. They would hold out to burn until the most belated sinner had steered his wet and sloppy catamaran into port. Now after having given this current a good horse to ride, in the shape of a copper conductor, we drive it through this diminutive filament, in a vacuum too, mind you, Skooney, and do you know what happens? It gets so hot under the collar at being held up, that it first gets red in the face and then grows hotter and crazier until it achieves a white heat, the highest expression of anger of which it is capable. And there you are, you hoary headed old Pennsylvania Dutchman; that is the Edison incandescent light, that you will hear more about before your snowy thatch turns back to the bonnie brown of your boyhood."

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 book is issued in two styles of binding, cloth and red morocco, the prices per copy being 25 and 50 cents, respectively. Address TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Mr. J. Fletcher, superintendent of the Canadian Pacific Railway Company's Telegraph at Vancouver, B. C., Canada, in renewing his subscription for another year, writes: "It is unnecessary for me to say anything in commendation of TELEGRAPH AND TELEPHONE AGE. Its worth as an up-to-date periodical is well established. But I can say that without it one would soon get into a rut and fall behind. The AGE fills an unique position in the life of every telegraph man."

The Turner Monument Fund.

As the time approaches for the dedication of the Turner Monument at Harriman (formerly Turner), N. Y., the arrangements are beginning to assume definite shape. Large delegations will represent the Association of Railway Telegraph Superintendents, the Old Time Telegraphers' and Historical Association, and the telegraph, telephone and railroad fraternity at large, and the affair promises to be a notable event.

The announcement has just been made by the committee that owing to the development of a flaw in the stone for the monument it will be necessary to get out an entirely new stone, which will delay the dedication of the monument about one month. The ceremonies, therefore, will not take place until about the middle of December, when the monument will be unveiled by Miss Gertrude M. Griffith, daughter of Mr. E. P. Griffith, chairman of the Monument fund. The dedicatory address will be delivered by Mr. Henry D. Estabrook, of New York, who is an orator of wide reputation and ability. Thus the sending of the first telegraphic train order, by Charles Minot, general superintendent of the Erie Railroad, will be fittingly commemorated.

Mrs. E. H. Harriman, of Arden, N. Y., will meet the cost of the stone and its carving. This work is now being done under the supervision of Mr. Charles T. Ford, of Central Valley, N. Y., superintendent of the Harriman estate, and it will be a great credit to the entire enterprise. The bronze tablet, which was designed by sculptor Charles Keck, of New York, is now being cast, and is a handsome and artistic production. It was illustrated in our issue for October 1.

The following named gentlemen constitute the committee in charge: E. P. Griffith, superintendent telegraph, Erie Railroad, New York, chairman; Charles Selden, superintendent telegraph, Baltimore & Ohio Railroad, Baltimore, Md.; J. B. Taltavall, Telegraph and Telephone Age, New York; E. A. Chenery, superintendent telegraph, Missouri Pacific Railroad, St. Louis, Mo.; W. J. Camp, electrical engineer, Canadian Pacific Railway, Montreal, Canada; Col. W. B. Wilson, president Society of the United States Military Telegraph Corps, Holmesburg, Philadelphia; F. J. Scherrer, secretary Old Time Telegraphers' and Historical Association, New York; David H. Bates, secretary Society of the United States Military Telegraph Corps, New York.

Mr. J. B. Taltavall, 253 Broadway, New York, is treasurer of the fund and will be glad to hear from anyone who wishes to contribute.

A portrait of Charles Minot, whose historical train order is to be commemorated by the erection of this monument, was published in our issue for April 16.

The contributions received up to date are as follows: Previously acknowledged, $1,675.49; C. D. Mallery, 50c.; C. L. Bridge, 50c.; James F. Washington, 25c.; M. J. Gallagher, 25c., all of Deposit, N. Y. Total, $1,676.99.

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INDUSTRIAL NEWS.

Telephone Protective Devices.—We have received a copy of a catalogue and price list of protective devices for telephone installations manufactured by Siemens Brothers & Company, London, England. It shows various styles of these devices and gives brief descriptions of each.

Making Receivers and Transmitters.—Last year the Western Electric Company consumed 1,500 tons of brass, over 300 tons of steel and 200 tons of rubber and other raw materials in the manufacture of Bell telephone receivers and transmitters. This work required 3,500,000 screws.

Telephone Dispatching on Lake Erie, Alliance & Wheeling.—The Lake Erie, Alliance & Wheeling Railroad has recently placed an order with the Western Electric Company for twenty-two of its selectors, which will be installed between Phalanx, Ohio, and Dillonville, Ohio. This line is 85 miles in length, and the dispatcher will be located at Alliance, Ohio.

Western Electric Company Business.—The Western Electric Company experienced a most satisfactory revival in orders billed out of its factories in September. The gain was 12% and the sales were the largest for that month in the company's history. For the nine months to September 30, Western Electric's gross earnings were 4% in excess of the same period last year, and a total overturn for the full twelve months of $66,000,000 is promised.

Telephone Train Dispatching on Raritan River Railroad.—The Raritan River Railroad has recently placed an order with the Western Electric Company for telephone selectors and associated telephone equipment for its line running from South Amboy, N. J., to New Brunswick, N. J., with a branch from Sayreville Junction to Sayreville, and another from Serviss Junction to Lyles. The dispatcher for these circuits will be located at South Amboy.

Telephone Train Dispatching.—The New York Central Railroad, the first railway in the world to install and put in service selective telephone train dispatching, has recently received from the United States Electric Company of New York 249 selector box outfits which will be used in the extension of its system over twelve circuits. These instruments, as are the others in service on that road, are the Gill bridging telephone selectors and are arranged for ringing the signal bell with the main line battery. The Baltimore & Ohio Railroad, also an extensive user of selective telephone dispatching apparatus of the same make, has placed orders for ninety-six box outfits, equally divided between train wire and message circuit equipment. The message circuit outfit has the intercommunicating features and is equipped for time transmission. The entire order is for the local battery type and in addition an existing circuit of twentyseven main line bells is to be changed to the local battery type. The order includes the company's standard auxiliary apparatus.

German Telephone Literature.—The Siemens & Halske A. G., Berlin, Germany, has issued two handsomely gotten-up pamphlets on "Telephone Exchanges" and "Automatic Telephony." The former is illustrated with excellent pictures of switchboards and other equipment, besides interior views of exchanges in prominent German cities, and the descriptive matter is very clear and complete. The pamphlet on "Automatic Telephony" contains a reprint of the paper of Prof. Dr. A. Raps on the occasion of the dinner of the Elektrotechnischer Verein, Berlin, November 26, 1910. The paper is a very complete discussion of the subject and is profusely illustrated, some of the views being of prominent automatic exchanges in the United States.

Municipal Electricians.

Pensions for Municipal Telegraph Employes.—The city attorney of Los Angeles, Cal., has decided that the employes of the Fire Alarm Bureau and Police Telegraph come under the provisions of the firemen's pension fund.

Automatic Fire Signal.—An automatic fire alarm red light signal has been devised by J. P. Flanagin, of Milwaukee, Wis. It is used in connection with regular street lamps. By automatically showing a red glass disc in a prominent place the approach of fire apparatus is shown, thus giving a free course for its passage.

New Automatic Fire Alarm.—An automatic fire alarm has been invented by Prof. J. H. Funderburg, Lake Charles, La. There are six or seven different styles of the automatic alarm, according to whether it is to be placed in hotels, public buildings or residences. The alarm is caused by the rising of mercury in a small tube when the heat reaches 110 degrees.

New York Telegraphers' Aid Society.

The New York Telegraphers' Aid Society's financial statement for the quarter ended September 6 is as follows:

Balance on hand June 6, 1910		$24,741.43
Receipts		1,457.80
Total		$26,199.23
DISBURSEMENTS.		
Sick benefits	$995.41	
Death benefits	500.00	
Expenses	210.11	1,705.52
Balance on hand Sept. 6, 1911		24,493.71
Total		$26,199.23
RELIEF FUND.		
Balance on hand June 6, 1911		$5,455.71
Receipts		82.70
Total		$5,538.41
Disbursements		$30.25
Balance on hand Sept. 6, 1911		5,508.16
Total		$5,538.41

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Conference of Western Union Commercial Managers and Managers at Pittsburgh.

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 the Fort Pitt Hotel, Pittsburgh, Pa. There were present Messrs. E. M. Mulford, division commercial superintendent; J. A. Hill, division traffic superintendent; W. A. Sawyer, district commercial superintendent; A. C. Kaufman, commercial agent, New York; J. M. Creamer, district traffic superintendent, Philadelphia; L. J. Davey, district manager, Jamestown, N. Y., and G. H. Bernard, local manager of the New York Telephone Company, Dunkirk, N. Y.

At the forenoon session the following programme was carried out: "Practical Suggestions," by J. C. McGrew; "Business Getting," by T. J. Jones; "Pungent Paragraphs," by I. N. Sharpnack; "Joint Telephone-Telegraph Offices," by L. L. Leith.

At the afternoon session the following subjects were considered: "Duties of a Manager," by Preston D. Callum; "Adjustment of Claims and Complaints with the Public," by P. M. Bacon; "Concentration of Mind," by R. O. Walters; "The Message," by G. S. Walters; "Our Reputation," by G. F. Stadtmiller; Demonstration of "Solicitor's Interview"—Mr. Preston D. Callum endeavored to sell day letter service to Mr. George S. Walters, general manager of a wholesale grocery house, Mr. A. C. Kaufman being his assistant.

In the evening dinner was served in the Dutch Room and remarks were made by visiting officials.

During the forenoon session the following cordial message of regret and greeting was received from Mr. A. G. Saylor, general superintendent, New York, and a committee was appointed to draft a suitable reply which was sent to Mr. Saylor:

"I regret that circumstances prevent my being with you to-day. I fully appreciate the efforts that have been made and it is gratifying to know that your splendid organization has brought about substantial results.

"On behalf of the company I wish to thank you individually and collectively for the interest displayed. The policy of the company is so well known that it is only necessary to refer to the fact that it will be fully carried out. I trust that your meeting will be both pleasant and profitable. Please remember me to all who are present."

Among those who took part in the conference were: H. Trent, manager, Bluefield, W. Va.; S. V. King, manager, Charleston, W. Va.; J. A. Miller, manager, Clarion, Pa.; U. W. Boggess, manager, Clarksburg, W. Va.; G. S. Walters, district commercial manager, Clarksburg, W. Va.; J. L. Snyder, manager, Cumberland, Md.; L. E. Swinney, manager, DuBois, Pa.; G. F. Stadtmiller, district commercial manager, and J. C. McGrew, manager, Erie, Pa.; W. T. McWhorter, manager, Fairmont, W. Va.; A. A. Jeunet, manager, Franklin, Pa.; E. R. Collins, district commercial manager, and C. H. Reed, manager, Huntington, W. Va.; R. O. Walters, manager, Jamestown, N. Y.; S. W. Kirk, manager, Johnstown, Pa.; J. F. Callahan, manager, New Castle, Pa.; M. F. Horne, manager, New Kensington, Pa.; A. J. Holland, manager, Oil City, Pa.: I. N. Sharpnack, manager, Parkersburg, W. Va.; G. T. Harris, manager, Ridgway, Pa.; F. W. Clark, manager, Sharon, Pa.; C. N. Reed, manager, Tarentum, Pa.; W. A. Blackburn, manager, Thurmond, W. Va.; L. A. Watson, manager, Uniontown, Pa.; R. C. House, manager, Washington, Pa.; H. Young, manager, Wheeling, W. Va.; J. C. Hale, special agent, Westfield, N. Y., and the following from Pittsburgh, P. D. Callum, division solicitor; E .A. Baird, manager; P. M. Bacon, claim adjuster; T. J. Jones, manager; Earl Burton, district supervisor, M. S.; W. J. Dodge, district traffic superintendent; H. Ratnor, traffic supervisor; L. L. Leith, special agent; L. S. Ward, manager; E. C. Bishop, manager; S. C. Moran, manager; J. K. Javens, solicitor; Henry Abrams, solicitor; Laura M. Ansley, manager, Indiana, Pa.; Mrs. H. B. Sells, manager, Warren, Pa.; Mrs. J. Rawson, manager, East Liberty, Pa., Miss M. A. Campbell, manager, Punxsutawney, Pa.; Miss E. R. McElwee, manager, McKeesport, Pa.

Opportunity for Telegraphers.

The International Correspondence Schools of Scranton, Pa., have probably to their credit a record of a greater number of promotions among commercial telegraph people than all other educational institutes combined. The telegraph operator just starting in business life will find these educational courses an easy path to promotion. Even the expert electrician finds it advantageous to become a student of the International Correspondence Schools.

When it is stated that this school has had hundreds of thousands of students scattered throughout the world all of whom had their knowledge and usefulness greatly increased, the advancement in salaries incident to their increased efficiency is beyond computation.

The International Correspondence Schools are better able today than at any previous period to assist beginners in telegraphy to become telephone and telegraph engineers and all others identified with the telegraph, the telephone and railroad service, and every individual owes it to himself to build up his efficiency and thus to derive the monetary reward which awaits increased knowledge.

Write for particulars to the International Correspondence Schools, Box 885, Scranton, Pa., and you will receive information that will at once prove convincing that it will be to the interest of everyone who wishes advancement to become enrolled among the thousands of students of this very worthy institution.

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T. M. B. A. Assessment.—Assessment No. 531 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of William B. Robinson at Glen Cove, N. Y.; Charles F. Whittenhall at Sabatha, Kan.; John D. Thompson at Baltimore, Md.; Bartlett F. Whitman at San Luis Obispo, Cal.; Aaron T. Cline at Wheeling, W. Va.; Christian Lorenzen at Brooklyn, N. Y.

LETTERS FROM OUR AGENTS.

NEW YORK POSTAL.

Mr. R. C. Mitchell, in charge at the *New York American* office (days), represented this company on the Glidden automobile tour from New York to Jacksonville, Fla. He returned to New York by steamer.

NEW YORK WESTERN UNION.

Senator W. L. Ives celebrated his seventieth birthday on October 24 and was the recipient of congratulations from many of his friends.

Mr. Martin Durivan, who has been located at West End, Long Branch, during the summer as chief operator, has returned to this office for the winter, resuming his former position.

Mr. John Simmonds of New York, representing the Western Union Telegraph Company, and Mr. Evelyn Harris, representing the Southern Bell Telephone Company, occupied a car in the Glidden automobile tour, between New York and Jacksonville, Fla., last month.

The annual entertainment of the New York Telegraphers' Aid Society for the benefit of the Relief Fund will take place on Tuesday evening, November 21, at the Lexington Ave. Opera House, Fifty-eighth Street near Third Avenue, Manhattan. Mr. James P. Clolery has been appointed chairman for this season and announces that the members of the various committees are making every effort to bring this year's event up to the standard and if possible surpass previous entertainments. The entertainment will consist of high class vaudeville followed by dancing.

PHILADELPHIA POSTAL.

Mr. E. B. Pillsbury, general superintendent, New York, and Mr. Harvey D. Reynolds, district superintendent, Buffalo, N. Y., were recent visitors at this office.

Extra repeaters are being installed by equipment chief C. A. Currier, under the supervision of chief operator E. W. Miller. There has been great need for these extra facilities, and this office is becoming an important repeating point.

Assistant wire chief Francis P. McElroy was married October 24 to Miss Mary T. Coyne, a well-known South Philadelphia vocal soloist. After a tour of California and the Middle West, the couple will reside at 2518 North 19th Street. The entire office staff extended their congratulations and best wishes to Mr. McElroy and his bride, which are heartily joined in by TELEGRAPH AND TELEPHONE AGE.

The great telegraphic song hit, "SEND ME A NIGHT LETTER, DEARIE." Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.

B. L. BRANNAN, 195 B'way, N. Y.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, combines fraternalism with sound business principles; it offers to the telegraph and telephone employe an absolutely safe form of protection, at a cost within the reach of all and lower than can be found elsewhere. Membership is only open to employes in commercial or railroad telegraph or telephone service, and it is manifestly to the interest of those who are eligible and wish to secure life insurance within their means, to secure without delay a certificate for $1,000 or $500, or both, at rates based on present age.

Rare Books For Sale.—Transactions of the American Institute of Electrical Engineers, Vols. 1 to 27, 1884 to 1908, monthly numbers, unbound, in excellent condition. $100. Geo. C. Maynard, U. S. National Museum, Washington, D. C.

OFFICE MANAGEMENT

Report writing—handling of telegraph office accounts—relation of the operator to the public—penmanship—Lectures and practical work.

A new course designed to prepare telegraph operators for advancement—a thorough course by leading experts.

Booklet "H" to any address.

EAST SIDE Y. M. C. A. TELEGRAPH SCHOOL
New York City

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.

Martin's double or single lever **VIBROPLEX** $7.50. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

James Uncles, NORTH ADAMS Massachusetts

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.

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Telegraph and Telephone Age

No. 22. NEW YORK, NOVEMBER 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Bridge Duplex.

Judging from the number of letters the writer has received requesting further information concerning the bridge duplex, especially at repeating stations, it is evident that some are under the impression that it is quite a complicated affair. No doubt this idea prevails to some extent because of the extra apparatus included in the complete outfit.

Now the bridge duplex holds the same relation to the new standard quadruplex system that the old polar duplex does to the old quadruplex, viz.: it is half of the quadruplex. Both types operate on the same basic principle—direction and quantity of current. The real difference between the two methods is the manner in which the polar relay is connected and the addition of accessories for the purpose of increasing its efficiency. Some of the extra equipment might be called emergency apparatus, inasmuch as it is not really a part of the duplex proper, and which, on a normal circuit, is seldom required. For instance, one piece of the additional apparatus is a "line resistance box," used for the purpose of lengthening the main and the artificial lines equally when, in wet weather or under certain other conditions, the regular duplex voltage or current furnished is too great for the circuit.

With the former polar duplex and quadruplex apparatus, when an E. M. F. of lesser value was required, it was usually customary to shift the circuit to another set supplied with proper voltage. The line resistance box simply renders it unnecessary to go to all that trouble.

Then we have a double knife-blade switch lever which is seldom used and not actually necessary, so far as duplex operation is concerned, but is a very convenient device for shifting the set from Morse to telephone circuits. There is also an extra three-point switch which cuts in or out the compensating resistance coils enclosed in the smaller inverted iron basin placed on top of the table.

At repeating stations tnere is also added a "leak box resistance," the purpose of which is to provide a side path of very high resistance, which path includes a very sensitive polar relay and sounder. This circuit taps the main line current near the contact points of the direct contact point repeater relay and diverts a small part of the current through the relay in this leak circuit. As the signals which the repeater attendant hears in the leak circuit are made by part of the main line current, it is obvious that he can thus tell exactly how the sender's signals arrive and pass through the repeater points.

The signal relays, buzzers and lamps are not part of the duplex proper, but are merely accessories for the purpose of calling the attendant's attention to circuits which require looking after.

The location, resistance values, and necessity for the various lamps, would be almost self-evident if attendants more generally acquired a better knowledge of the normal current required for the operation of each relay, sounder or other magnet in the various circuits.

For example, take the small 2-c. p. signal lamp. It operates short circuited on 26 volts—in other words, it is an Edison 26-volt lamp. As our local circuits are fed by the 26-volt dynamo, it is evident that no lamp is required in that circuit. But suppose it is desired to use this lamp at some point where the local battery voltage is greater. If it is known how much current it requires the lamp can still be used; otherwise it cannot. Now this little signal lamp requires about 350 milliamperes of current, so with any greater value of e. m. f. the current could be reduced to 350 and the lamp would still be available.

Again we know that the normal local current for duplex and quadruplex loops is 250 milliamperes. Hence for the artificial circuit which we substitute for a loop, we must use a lamp that will take the same volume of current. In other words, it must have the same resistance as that of the loop it displaces. As all duplex loops have a uniform resistance of approximately 100 ohms, lamps of that rating only must be used for such circuits.

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Wherever a lamp of less than 100 volts is found in the 26-volt circuit, it is in series with some magnet that operates on 250 milliamperes of current. The resistance of this lamp plus the resistance of the magnet coil, etc., should amount to 100 ohms.

One exception to this rule is the 80-ohm lamp used in connection with the push button for the one-ohm signal relay. This relay is connected in the local circuit, which has a total resistance of 100 ohms and is unaffected by the normal local current of 250 milliamperes which passes through its coils, because it requires about 350 milliamperes for its operation. So an 80-ohm lamp is grounded on one side, the other side being connected to the push-button for the purpose of shortening the circuit containing the signal relay when the button is depressed, and thus providing the necessary 350 milliamperes of current. This accounts for and suggests the location of the 80-ohm lamp. A good way to avoid confusion is to study the theoretical diagrams of the bridge duplex proper, and the telephone connection and apparatus as shown in the Western Union official instruction pamphlets, separately. They are very simple and easily understood.

Recent Telegraph and Telephone Patents.

ISSUED OCTOBER 17.

1,005,862. Printing Telegraph. To A. S. McCaskey, Chicago, Ill.

1,006,112. Printing-Telegraph System. To A. S. McCaskey, Chicago, Ill.

1,006,344. Printing Telegraph. To M. S. Ayau, New York.

ISSUED OCTOBER 24.

1,006,591. Device for Holding Receivers of Telephones. To E. L. Persons, Concord, N. H.

1,006,615. Central-Energy Telephone System. To C. S. Winston, Chicago, Ill.

1,006,635 and 1,006,636. Space Telephony. To L. De Forest, New York.

1,006,786. Space Telegraphy. To G. S. Piggott, Chicago, Ill.

1,006,833. Telephone Receiver. To W. W. Dean, Elyria, Ohio.

1,007,030. Telephone Transmitter. To A. A. Jahnke, Richmond, Cal.

1,007,031. Microphone Transmitter. To A. A. Jahnke, Richmond, Cal.

1,007,036. Telephone System. To A. D. T. Libby, Elyria, Ohio.

ISSUED OCTOBER 31.

1,007,344. Telephone-System Signaling Apparatus. To J. Erickson, Chicago, Ill.

1,007,373. Bracket Telephone. To W. C. Moeller, Doon, Iowa.

1,007,575. Telephone System. To H. F. Joeckel, Camp Point, Ill.

Every one engaged in telegraphy and telephony should be a constant reader of TELEGRAPH AND TELEPHONE AGE. It gives the latest news in both these fields. Subscribe now. Subscription price, $2.00 per year.

FINANCIAL.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange November 13.

Western Union Tel. Co.	78
Mackay Companies	85½
" " pfd.	73
Amer. Telep. and Teleg. Co.	139

Dividend.—The American District Telegraph Company of New York has declared a dividend of 1 per cent, payable November 15.

Personal.

Mr. P. L. Thomson has been appointed advertising manager for the Western Electric Company at New York, vice Mr. F. X. Cleary, resigned. Mr. Thomson was formerly manager of the Western Electric Company's Pittsburgh house. Mr. Cleary will engage in special advertising and sales-promotion service.

Mr. F. G. Creed, of London, England, inventor of the Creed printing telegraph system, sailed for England on November 8, after a visit of a few weeks in the United States on business. Mr. Creed was accompanied by Mr. R. J. Young, a former telegrapher in the United States and Canada, who is now associated with him in a business capacity.

Mr. William McMaster, vice-president of the Montreal Telegraph Company, Montreal, Que., has been elected president and director of the company to succeed Mr. Hugh A. Allan, resigned. Mr. William Wainwright succeeds Mr. McMaster as vice-president. A member of the Allan family has been at the head of the Montreal Telegraph Company for over half a century.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. E. J. Nally, vice-president and general manager, is at the present time on the Pacific Coast.

Mr. L. Lemon, division superintendent, New York, has returned from Pittsburgh, Pa., where he spent a week on business connected with the service.

Mr. W. I. Capen, general superintendent of plant, New York, has returned from Florida where he went on a combined business and pleasure trip.

Mr. Henry F. Hawkins has been appointed general agent of the money transfer department of this company at New York, vice Edward S. Butterfield, resigned.

Mr. M. B. Fisher, secretary and treasurer of the Fort Wayne Postal Telegraph Company, Fort Wayne, Ind., was a recent New York visitor. Mr. Fisher is a prominent citizen of Fort Wayne.

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This company is doing some extensive underground work in Washington, D. C., under the supervision of Mr. W. I. Capen, general superintendent of plant, New York.

An important branch office has been established in the new May building, at the corner of Fifth and Liberty Avenues, Pittsburgh, Pa. It is under the management of Mr. A. D. Wise, formerly of the office at Twenty-first Street and Penn Avenue.

Nelson E. Church, Manager, at New Orleans.

Mr. Nelson E. Church, whose appointment as manager of the Postal Telegraph-Cable Company at New Orleans, La., was announced in our issue of October 16, is a native of Ohio, having been born at Newark in that State on April 8, 1861. He began his telegraphic career in Newark in 1879, being employed by the American Union and Baltimore and Ohio Telegraph Companies. When the former company was consolidated with the Western Union Mr. Church became manager

N. E. CHURCH,
Manager, Postal Telegraph-Cable Company, New Orleans, La.

of that company's office in Newark. He resigned to enter the service of the Baltimore and Ohio R. R. in 1882. After that Mr. Church was at different times in the service of the Bankers and Merchants Telegraph Company and the Baltimore and Ohio Telegraph Company, and when the latter company was absorbed by the Western Union he entered the latter company's service in New York. On January 1, 1891, he was appointed cashier and transfer agent at Pittsburgh, later becoming manager of that office and afterwards superintendent, which position he recently resigned.

The Postal in the Austin Flood.—When Austin, Pa., was destroyed by the flood on September 30, the nearest Postal Telegraph office, in the Pennsylvania Railroad station at Keating Summit, eight miles from Austin, became the headquarters for newspaper men as well as the public. Six circuits were immediately rendered available to Pittsburgh, Philadelphia, Buffalo and New York, manned by three Pennsylvania Railroad operators, Messrs John Hixon, C. E. Butzer and C. S. Simmons, and four Postal Telegraph operators, Messrs. L. J. Reynolds, Frank Burger, B. W. Austin and Joseph Lundy, detailed from nearby points in charge of division operator Daley of the Pennsylvania Railroad, and superintendent Reynolds and manager Newman of Buffalo. Over fifty thousand words of newspaper reports were sent over the wires on October 2, besides a large amount of commercial telegraph business. The fine service and conscientious devotion to duty of the Pennsylvania Railroad and Postal telegraph operators evoked the highest praise and thanks of the newspaper correspondents as well as the public. The work was done under the supervision of superintendent of telegraphs of the Pennsylvania Railroad, Mr. J. C. Johnson.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

President Theo. N. Vail is absent on a business and pleasure trip to the Pacific coast. He is being accompanied by the officials through whose territory he passes.

Mr. Belvidere Brooks, general manager, has gone to Chicago on a business trip. He is accompanied by Mr. G. M. Yorke, engineer, Mr. E. Y. Gallaher, auditor, Mr. Robert E. Chetwood, engineer of construction and Mr. W. N. Fashbaugh, traffic engineer.

Mr. T. W. Carroll, assistant to the general manager, is making a business trip through the Southern states.

Mr. W. H. Baker, vice-president of the American District Telegraph Company of New Jersey, New York, was elected secretary of this company at a meeting of the executive committee November 8. Mr. F. W. Lienau was appointed assistant secretary at the same meeting. The office of the secretary has been moved to the fifth floor of the building.

Mr. J. S. Calvert, superintendent at Richmond, Va., reports the following appointments of managers in the first district, southern division: Mr. J. C. Davis, at Florence, S. C., vice I. L. Goolsby; Miss Veta Richardson, at Blackville, S. C., vice B. F. Leland, who leaves the service; Mr. T. B. Smith, at Bennettsville, S. C., vice Geo. W. Gyles; Mr. W. R. Williamson, at Elizabeth City, N. C., vice Chas. Guirkin, who leaves the service; Mr. G. E. Wood, at Wilmington, N. C., vice E. L. Spooner, who enters the operating department.

Mr. I. N. Miller, Jr., assistant general superintendent, San Francisco, Cal., has resigned.

This company has abolished message delivery charges within city limits in all cities where such charges have been made heretofore.

As far as is known the oldest employe of the Western Union Telegraph Company in point of service is Mr. J. H. Seaborn, battery man at Jackson, Tenn., who began his telegraphic career in 1846 or 1847.

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E. A. Baird, Manager, Pittsburgh, Pa.

Mr. Edward A. Baird, manager of the Western Union Telegraph office at Pittsburgh, Pa., whose appointment was announced in our issue of October 16, was born in Narrowsburg, N. Y., September 7, 1874. He entered the telegraph service at Warsaw, N. Y., in 1891, and has since that time held the position of manager at Warsaw, Elmira and Binghamton, N. Y. He afterwards became chief clerk to division commercial superintendent E. M. Mulford, district commercial superintendent J. F. Nathan and district commercial superintendent W. A. Sawyer, New York, successively, finally receiving the appointment as manager at Pittsburgh, Pa., as announced. Mr. Baird's duties have been of an executive character all through his business career and he is therefore eminently fitted by experience to fill his new post.

J. S. Berger, Manager, Lexington, Ky.

Mr. J. S. Berger, manager of the Western Union Telegraph office at Lexington, Ky., was born in Catlettsburg, Ky., twenty-seven years ago and entered the telegraph service in 1899 as messenger at the same point. In 1900 he became an operator and worked for four years at various places on the Chesapeake and Ohio, the Norfolk and Western and the Louisville and Nashville Railroads. Mr. Berger entered the service of the Western Union in October, 1904, as manager at Catlettsburg and in March, 1911, he became manager of the Ashland, Ky., office of the same company which position he held at the time of his recent promotion to the Lexington managership.

Augusta, Ga., Western Union Office.

The Western Union office at Augusta, Ga., has long been an important telegraphic point, not because of its large local business alone, but also because its location makes it the largest relay station in the South Atlantic States. These conditions make it necessary that the equipment of the plant, the force of operators and of efficiency must meet the demands. To all of these requirements the company has and is adding as occasion requires. This office relays business for North Carolina, South Carolina, Georgia and Florida and many points outside of this territory. It employs regularly thirty-five operators, not including chiefs and clerical force. A large force of messenger boys is also employed. The equipment is of the most modern type, and includes the latest improved quadruplex apparatus. There are eighty wires running into the switchboard. During the past year the office of the company has been remodelled at heavy cost.

The entire business of the Western Union Company in Augusta is under the management of Mr. L. R. Daniel. He is ably assisted by P. J. McLaughlin as assistant manager and cashier, G. W. Hammell, chief operator, A. Potter, wire chief, W. E. Seward, night chief operator, Charles Smith, traffic chief, C. F. Bradley, repeater chief, and G. T. Rhodes, all-night chief. The company maintains a branch office on the floor of the Cotton Exchange, which is under the management of Arthur T. Carter. He has also two regular assistants.

Philadelphia Conference of Western Union Superintendents and Managers.

A largely attended meeting of representative officials of the Western Union Telegraph Company was held at the Hotel Walton, Philadelphia, October 19. Mr. J. W. Reed, district commercial superintendent, Philadelphia, who presided, opened the session with an introductory address, in which he clearly set forth the purpose of the meeting, and personified the keynote of his address—"Enthusiasm and Optimism"—to such an extent that his hearers caught the spirit, and carried it into their speeches. Every man in the assemblage was made to feel that. in the Western Union, its welfare and destiny, he had a keen personal interest, and upon his efforts depended largely whether or not it would attain to the high position it aims to fill in the telegraph world.

Papers were read as follows: Efficiency of Messenger Service, by Mr. V. J. Albert; Solicitation of Business, by Mr. R. A. Black and Mr. E. H. Shriner; Office Atmosphere, by Mr. C. J. Swartz; Enthusiasm, by Mr. S. Gray; Salesmanship in Selling Service, by Mr. A. W. Springer.

A lively tilt then followed between Messrs. J. M. Creamer, of Philadelphia, and Mr. A. C. Kaufman, of New York, who gave a practical demonstration of how to approach a prospective customer. This feature was very entertaining and instructive. Other speakers were Mr. R. C. Mason who spoke on the relations between telegraph and telephone companies, Mr. G. W. Deetz. on Efficiency in Messenger Service, Mr. E. R. Kidwell, on Scientific Talk, and Mr. W. E. Mears. on facilities in the great fruit growing belt of Eastern Virginia.

A general discussion then followed on the scientific handling of business, which was ably covered by Mr. E. M. Mulford and Mr. J. A. Hill. The handling of newspaper loops was next considered the discussion being participated in by nearly all present.

Other subjects discussed were: Courtesy. by Mr. F. M. Von Nieda, Day Letter Business, by Mr. W. H. Hamilton, General Remarks, by Mr. G. W. Honsberger, How to Secure Customers. by Mr. M. C. Niepling, Messenger Neatness, by Mr. H. A. Hahl, and Quick Transmission of Messages, by Mr. G. O. Bentz.

After the reading and discussion of the papers division commercial superintendent Mr. E. M. Mulford, New York, spoke at considerable length on the financial condition of the company, its determination to perfect its facilities and better the conditions of its employes, and expressed himself as being well pleased with the results obtained by

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the employes of the commercial department in the fourth district.

Mr. Mulford was followed by Mr. A. C. Kaufman, of New York, who delivered a very interesting and instructive address on business-getting, dwelling particularly on the creation of new business and the importance of rendering prompt and accurate service.

Mr. I. D. Maize was present and spoke in a very entertaining manner concerning the importance of friendly co-operation on the part of telegraph operators.

Those present were: Messrs. J. W. Reed, district commercial superintendent; S. M. Custer, fourth district commercial manager; R. J. Meigs, district plant superintendent; J. M. Creamer, district traffic superintendent; R. A. Black, city manager; E. J. Smith, assistant city manager; E. H. Shriner, M. C. Niepling and H. A. Hahl, commercial managers; R. C. Murray, plant chief; S. R. Crowder, inspector of equipment; R. C. Mason, special agent commercial department; J. S. W. Phillips, inspector; W. G. Patterson, claim agent; F. R. Webb, general traffic chief; H. D. Austin, district traffic supervisor; F. G. Lamb, chief clerk; D. P. Carlin, J. A. MacLeod, W. C. Finan, P. A. Simpson, V. G. Hudgins, J. W. Benckert, E. M. Taney, B. P. Shreve, W. M. Kalmey, of the *Evening Telegraph*, and John Rowles, all of Philadelphia. Messrs. E. M. Mulford, division commercial superintendent; J. A. Hill, division traffic superintendent, and A. C. Kaufman, division commercial agent, New York. Messrs. J. W. Collins, traffic chief, and E. R. Kidwell, Washington, D. C.; Messrs. V. J. Albert district commercial manager; E. S. Anderson, traffic manager, and G. W. Honsberger, solicitor, Baltimore, Md. Messrs. S. Gray, manger, and A. W. Springer, district commercial manager, Wilmington, Del. Mr. C. J. Swartz, manager, Trenton, N. J. Mr. F. G. Seitz, manager, Camden, N. J. Messrs. G. Catherman, manager, and F. M. Von Nieda, district commercial manager, Harrisburg, Pa. Mr. J. F. Firey, manager, Hagerstown, Md. Mr. J. H. Wilson, manager, Altoona, Pa. Mr. W. E. Mears, district commercial manager, Parksley, Va. Mr. W. L. Sullenberger, manager, Lancaster, Pa. Mr. W. H. Hamilton, manager, West Chester, Pa. Mr. G. W. Deetz, manager, Atlantic City, N. J.

The Cable.

Cable Between Trieste and Alexandria.—A company is to be formed in Austria for the purpose of establishing and working a cable between Trieste, Austria, and Alexandria, Egypt.

Cable Subsidy.—The Australasia and China Telegraph Company, Limited, has been given the right to be heard before the United States Court of Claims in its case against the United States for $109,462 and interest as payment of a subsidy guaranteed by the Spanish Government in 1897 for a cable connecting four of the Philippine Islands.

The Telephone.

Extension of Rural Telephone Service.—The Cumberland Telephone and Telegraph Company will make large extensions of its rural lines in Mississippi during the next six months.

Reduction of Telephone Bills Ordered.—The Oklahoma Corporation Commission has ordered the Pioneer Telephone and Telegraph Company to render "adequate service in Muskogee" and that the November 1 bills "be reduced one-third of the customary prices charged."

Protection of Telegraph and Telephone Property in Missouri.—It is a felony in the State of Missouri to injure, molest or destroy telegraph or telephone instruments and property and such offenses are punishable by imprisonment for two years or by fine not exceeding $500.

News Service by Telephone.—The Houghton, Mich., *Gazette* refers editorially to the substitution of the telephone for the telegraph for the transmission of news service, and expresses itself well pleased with it. The paper was compelled to resort to the telephone on account of the increase of telegraph rates made necessary by the law regulating interstate commerce.

Telephony in Japan.—The telephone business of Japan is in charge of the Imperial Japanese government, and there are no private commercial lines. The telephone business is rapidly increasing and it is the intention of the authorities to double the present equipment within six years. In 1906 there were 336 stations and offices and 43,266 subscribers, while in 1910 there were 2,233 stations and offices and 126,720 subscribers.

New Telephone Building in Buffalo.—The New York Telephone Company has awarded the contract for a new central office building in Buffalo, N. Y., to be known as the Bryant-Tupper Central Office. The building will have a frontage of 98 feet and a depth of 93 feet, and will be of fireproof construction. It will cost $90,000. The initial building is designed for one 10,000-line local switchboard, and the plans provide for the addition of three stories in the future if necessary.

Telephone Message Recorders.—Mr. Albert Baumgartner, of St. Gall, Switzerland, is the inventor of an instrument to record telephone communications in the absence of the person called and to reproduce them when desired. It is stated that Mr. E. G. Godfree, of the Victorian Railway department, Victoria, has devised an automatic registering device for telephone calls, which is operated by the removal of the receivers from the hooks of two subscribers when put into communication.

Taxes.—Mr. E. S. Pillsbury, attorney for the Pacific States Telephone and Telegraph Company, San Francisco, Cal., appeared before the United States Supreme Court recently and argued against the collection of the tax imposed upon that company by the State of Oregon under the initiative and referendum statute. Judgment was taken against

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the company and the Supreme Court of Oregon sustained it. The company then brought the case to the United States Supreme Court.

Fire Alarm By Telephone.—Mr. Walter Maxwell, of Dayton, Ohio, calls attention to the importance of the use of the telephone as a means of extensive fire prevention. "We ought to impress upon the people," says Mr. Maxwell, "the facilities of the telephone for sending in an alarm of fire. The people should be generally informed through the newspapers and other agencies that they are at liberty, free of any charge, to use any telephone to send in an alarm of fire. Once they understand this we thus establish thousands of fire alarm stations instead of the few regular alarm boxes. Another advantage of the notification of fire by telephone is the fact that the firemen may respond and come to the exact place of the fire, thus saving time and of course more efficiently effect the saving of life and property."

Boston Plant Chapter of the Telephone and Telegraph Society of New England.

The third regular meeting of this society was held November 14, in the Auditorium of the Edison Building, Boston, Mass. Mr. I. O. Wright, assistant general superintendent of plant, New England Telephone & Telegraph Company, addressed the Chapter on various phases of the telephone and telegraph business from a plant standpoint.

He discussed the "Opportunity" of the corporation and of the employe brought about by the recent getting together of the American Telephone & Telegraph Company and the Western Union Telegraph Company.

Mr. Wright is one of the "Telephone Pioneers of America," and previous to his entrance into the telephone service in 1890, he was identified with the telegraph interests.

The membership of the Chapter includes American Telephone & Telegraph and Western Union men.

Radio-Telegraphy.

Wireless in Chili.—The government of Chili has contracted for a series of Marconi wireless stations along the coast from Africa to Sandy Point.

Mr. Wm. Marconi.—The King of Italy will soon confer a title upon Mr. William Marconi in recognition of his patriotism.

Wireless Suit.—A suit has been started in the United States Circuit Court at Trenton, N. J., by the Marconi Wireless Telegraph Company, a New Jersey corporation, against the National Electric Signalling Company for infringment of patents.

Wireless Across the Pacific.—Wireless communication was held for a short time on October 5 between the San Francisco operator at Hill Crest and the Hokushu station, Japan, 6,000 miles distant. Hokushu is the most northern wireless station of Japan.

The Arlington, Va., Wireless Station.—The new naval wireless station at Arlington, Va., opposite Washington, D. C., will be in charge of Lieut. E. B. Woodward who has been detached from the battleship *Ohio* for the purpose.

Wireless Corps at Cornell University.—Lieut. W. A. Gilmore, U. S. A., has been detailed to Cornell University as professor of military science and tactics. He will form a wireless telegraph detachment of sixteen men in the signal corps of the Cornell cadet battalion.

Wireless at Liverpool.—Arrangements have been made by which it will be possible for a ship in the River Mersey to communicate with vessels in dock at Liverpool, England. Hitherto this was prohibited, as all messages are supposed to pass through the hands of the postal telegraph authorities.

Cooking Eggs on Ice by Wireless.—Mr. E. J. Rose promises to give a demonstration of the art of cooking eggs on ice by wireless waves at the Los Angeles electrical exposition. If he directs his waves upon cold storage plants consumers may be able to buy their eggs already cooked. It is not stated whether he can cook them in every style.

Wireless on the Atlantic Airship Akron.—It is stated that the wireless telegraph apparatus on the airship "Akron" in which Mr. Melvin Vaniman will attempt to cross the Atlantic Ocean, will have a radius equal to that of any of the largest ocean steamers. Mr. Jack Irwin will be the wireless operator on this expedition.

Wireless Weather Bulletins.—The secretary of the Navy at Washington has issued instructions to all the naval wireless stations on the Atlantic and Gulf coasts to ask for special weather reports on observations from vessels at sea whenever required by the chief of the Weather Bureau. It is expected that the wireless stations will also send out to vessels at sea all weather bulletins which may be of service as a warning of approaching storms.

Wireless for the Philippine Islands.—The Joint Wireless Board, consisting of Secretary C. B. Elliott and several army and navy officers, recommends that a complete system of wireless telegraph be installed in the Philippine Islands for the use of the civil government and the army and navy. The report calls for thirteen principal stations, beginning with Batan Island north of Luzon and extending to Jolo on the south. Also fourteen intermediate and low-power stations are recommended. The estimated cost of installation is $300,000.

Wireless Differences Settled.—It is announced that the patent differences between Marconi's Wireless Telegraph Company, Limited, of England, and the Lodge Muirhead Syndicate, have been settled, and that all of the Lodge patents applying to wireless telegraphy have been taken over by the Marconi Company. Sir Oliver Lodge, the well-known British scientist, it was also announced, has become an associate scientific adviser of the Marconi Company.

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The Passing of the Old—Some Interesting Correspondence.

In our issue for October 16 we printed under the heading "The Passing of the Old," an article embodying the substance of a letter from Mr. D. H. Fitch, of Cazenovia, N. Y., an old time telegrapher, which has given rise to the following interesting correspondence between Colonel Robert C. Clowry, of New York and Mr. Fitch:

"New York, October 18, 1911.

"D. H. Fitch, Esq.,
"Cazenovia, N. Y.

"My dear Mr. Fitch:

"I have just read your reminiscences as published on page 681 of TELEGRAPH AND TELEPHONE AGE of October 15.

"Sometime about 1864, I think, I accompanied some United States troops that were sent to North Missouri, and when we reached the Missouri River opposite St. Charles, Mo., we found that the ferry boat was laid up on the St. Charles side, on account of ice. The commander of the troops was very anxious to get them across the river, but there was no telegraph crossing, or, if there had been, it was interrupted. My recollection is that to meet the emergency I went on the engine and by sounding the whistle called 'SC,' the telegraph call for St. Charles, and 'D H F' your initials, as I think you were superintendent of telegraph on the North Missouri Railroad and was at St. Charles at the time. It is also my recollection that the call was answered by you on the locomotive on the St. Charles side and I 'Morsed' you through the whistle to send over the ferry boat. It is barely possible that this may have been a dream of mine, but I think it is true. Have you any recollection of it?

"I remember you as an expert electrician and most competent officer at that time.

"Very truly yours,
"(Signed) R. C. Clowry."

"Cazenovia, N. Y., October 20, 1911.

"Col. Robert C. Clowry,
"New York.

"My dear Col. Clowry:

"Nothing has given me more pleasure than your letter of the 18th. There are few of us left now, and we ought to keep more in touch with each other than we have for many years in the past. Let me say at first that I have not forgotten your kindness to me when I was 'green' fifty-one years ago, now, as well as later when I became more ripe. Your memory in the main agrees with mine.

"On January 1, 1864, Captain Smith sent me to St. Charles as military operator. Very soon after Mr. Sturgeon appointed me train master of the North Missouri Railroad and on June 1 Captain Smith put me in charge of all the line on that road.

"We laid a cable at St. Charles, in 1863, but at the time you speak of it had failed. You knew from experience that no cable could long endure the rapid flow and changing bottom of the Missouri River, and you wisely used high span wires of steel instead. When we laid the St. Charles cable we laid it in V shape instead of directly across. We went diagonally down the river about a quarter of a mile to the middle and then turned and went up to the other side in the same way, hoping that this angle to the flow would relieve the strain, and permit the cable to adjust itself to the changing bottom, and probably it did, but nothing could save it from the snags and drift wood which must catch in the lower bend. Like all others, it failed.

"If I remember right, the time of which you speak was when General Price made his last raid to the North, hoping to take Jefferson City, but did not. Some of his force was on the south side of the river near Washington, only a few miles above St. Charles. One day the Washington ferry boat, which they had tried to capture, came down to St. Charles full of bullet holes—one ball had struck the barrel of a musket in the pilot house, flattened and bent it, but no one on board was hurt.

"As a matter of prudence, we kept our boat on the north side of the river, when not amply guarded, and this was the case on the day of which you speak.

"Assure yourself, it was no dream; it is as clear to me as if it happened yesterday. I was in my office, the only operator in St. Charles. I heard your call and ran to the yard engine to answer it. There never had been any difficulty in reading your 'Morse' and the case was not different then. I got your message by steam whistle without any difficulty, and we did more. I sent to you in the same way a train order for a train on that side of the river, and I well remember how we congratulated each other on our achievement when you got across the river.

"I never want to see another year like 1864. Military transportation is no work for children, even if there are ample facilities and the best of conditions, but when you have to comply, or try to, with the arbitrary and imperative orders of military officers, who know nothing of railroad management, on a road whose equipment is insufficient and badly worn, on a track where the guerillas permitted little repair, is a task which I think I succeeded fairly well in performing or as well as conditions permitted, but I do not wish to try it again. During General Price's last raid I sat at my instrument three consecutive days and nights, and toward the end I had 'Old John' Cantrell wake me on my call and go to another room with me and wake me up there. All of this time I was giving train orders in which there must be no error, and fortunately there was none; the strain, however, made a physical wreck of me. At the end of the year I had to give it up and go home and sleep three months, as I did, worn out at 27 years of age.

"I am glad to know that you are so well and hope you may long continue so. I am quite well

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—much better than many men of less years. My duties here are light and of a kind which it has always been pleasant for me to do—a sort of a perpetual recreation. I always was an electrical crank and have not recovered.

"Truly yours,
"(Signed) Derick H. Fitch."

Message Blank Holders.

The Western Union Telegraph Company has introduced a convenient means for caring for the several forms of message blanks upon operating tables, this having been rendered necessary through the increase in the number of different classes of service.

A large number of different blanks when placed upon the tables, soon become scattered, presenting an untidy appearance and forming a serious risk of loss of messages. In order to obviate these objections a holder has been designed by the engineer of equipment, Mr. W. E. Athearn. It will care for all classes of message forms now in use, but where an operator is receiving a majority of only one class of message, a larger supply of that form may be placed upon the table near the operator, and the other forms in the holder, where they may be instantly reached when required.

On the front of each holder, is furnished a card holder, into which can be placed a card bearing the wire number, name of office or offices upon same, hours at which such offices are open, and any other information which is necessary.

A wall rack has also been designed. These racks are to be placed at convenient points either on walls or columns allowing one wall rack to approximately each 16 positions.

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.

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.

Mr. Aris Brown, chief clerk to W. K. McClarin, district plant superintendent of the Western Union Telegraph Company, Nashville, Tenn., in sending us two subscriptions, writes: "Your paper has proven of much value to me and I am recommending it to all plant employes. I believe your educational course in technical telegraphy will prove of inestimable value to a large class of employes and should be taken advantage of by all earnest students."

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Multiple Telegraphy.

In a paper read by Major W. A. J. O'Meara at the recent International Electrical Congress at Turin, Italy, that gentleman described various systems of multiple telegraphy. He divided the systems into four classes employing (1) signalling currents which varied not only in strength, but also in direction; (2) signalling currents of moderately high frequency working in conjunction with others of different frequencies or with ordinary telegraph currents; (3) signalling currents built up of a series of impulses sent at short and very frequent intervals; (4) signalling currents consisting of a number of impulses of varying duration sent at regularly recurring intervals.

The first class is represented by the Morse quadruplex system and its many variations, of which the flexibility had been increased greatly in recent years. The system had been found well suited for small offices, as its maintenance required no mechanical skill and very little electrical knowledge. Its cost was also very low as compared with some other multiple systems. Nevertheless the system still had its weaknesses, owing chiefly to the fact that the direction of current in a line could not be reversed without momentarily having no current on that line.

The second class was represented by the Mercadier system, in which different rates of alternating currents were supplied at the transmitting end to actuate receivers which responded only to one particular frequency at the corresponding terminal station. This system, although not adopted on British telegraph lines, had been subjected to experimental investigation on two or three occasions, and the results had demonstrated its practicability; but it possessed the objectionable feature that serious disturbances were produced on neighboring telephone circuits. In this class were also included the Phonophore and Picard systems.

The third class was illustrated by the Delany system, in which the separate channels were worked by the usual Morse keys, each sending continuously at about twenty-five words a minute. A distributor at each end automatically connected the line to the several corresponding sending and receiving sets for brief but frequent intervals, which obviously entailed the mutilation of the signals before going out to line, and necessitated the use of devices at the receiving end to rectify the distortion. The system worked well for a number of years on several circuits in England, but eventually had to be abandoned because of the more or less imperfect character of the signals. In order to improve the working Mr. S. A. Pollock developed a duplex arrangement of a quadruplex set, which, in addition to providing eight channels, enabled longer segments to be used. The set worked very well indeed, and 400 to 480 messages in the hour were actually handled on a single aerial wire 180 miles in length. The apparatus was eventually abandoned on account, among other causes, of the difficulty in maintaining a sufficiently accurate balance for the speed required on aerial lines in the variable climate of England.

In the fourth class the line was joined at regular periods to the different channels in succession, thus allowing the signals to go out to line without being mutilated. The method originated in the Meyer multiplex, where an eight-key transmitting device was utilized to form a Morse letter in connection with a distributor which sent out the signals to line. At the receiving end each Morse letter was printed across a tape, instead of along it, as was now the general practice. The sending was performed by forming one letter per revolution of the distributor on each transmitting device or keyboard. This arrangement did not present any serious disadvantages, but the received record had to be transcribed from the slip, instead of being written from a sounder, as in the Delany system.

The Baudot abolished the tedious operation of writing from slip, and very soon it displaced the Meyer system. The vast difference in line speed required for a sextuple Baudot and sextuple Delany was most marked, the Baudot requiring only one-fifth of the Delany. The Baudot gave typed characters at the receiving end, and another advantage was the practicability of obtaining separate channels on one wire working quite independently to different stations. The Baudot had been adopted comparatively recently for inland working, but sufficient apparatus was not yet available to carry out any comprehensive scheme involving the most advantageous use of line plant. The system had been adopted on the Continent, and in France it had been developed as a duplex system, which, it was understood, fully met the requirements of that country. In October, 1910, the British post office had installed a quadruple duplex giving eight channels (four in each direction) on an underground line between London and Birmingham, also a double duplex between London and Berlin over a submarine cable of about 500 kilometres (310 miles) in August, 1910. The results obtained on these circuits were eminently satisfactory. It was proposed shortly to install a sextuple duplex system between London and Birmingham, and if the experiment should prove successful, the Baudot system would have proved itself the most expeditious machine-printing telegraph system yet invented for dealing with large volumes of traffic. The Murray multiplex, Munier and Rowland systems, all belonging to the fourth class, were also dealt with.

With a multiplex system the message was dealt with immediately it was received, and corrections were asked for and given at once without any delay. Further, the multiple systems had the great merit of enabling the fullest use to be made of the line time in dealing not only with line, but also with short messages. The general public had in consequence the advantage of a quicker service than was possible with ordinary high-speed transmission systems requiring the preliminary pre-

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paration of a perforated tape. It seemed probable that future developments in printing telegraphs must follow the lead of the Baudot principle on account of the great advantage in respect of the saving of line time, and from the point of view of simplicity in mechanical details.

Reminiscences by Mr. G. M. Eitemiller.

Mr. George M. Eitemiller, for many years a resident of Detroit, Mich., one of the foremost telegraphers in the United States for the past forty years, in a recent letter to the editor of this publication makes a few observations that are of interest. Among other things he says: "I remember Charles C. Adams, now vice-president of the Postal Telegraph-Cable Company, New York, when he was a youngster at Parker Landing in the "lively oil days" when James B. Coulter, Paul W. Bossart, William Talcott and the writer were the teams on the Parker-Oil City duplex, handling from 2,500 to 3,000 messages during exchange hours, often counting our own checks on messages thrown before us. Where would the "bug" machines and the typewriter come in on that speed? Yet the youngsters of to-day smile in derision when we happen to speak of it. I cannot forget those good old days. I now smile when I recall the Philadelphia "shorts" that Walter P. Phillips and the writer worked out of old 145 Broadway with E. C. Boileau, P. V. De Graw or Charles Moore at the Philadelphia end. Thomas G. Kennedy, the night chief operator, would cut in at the New York switchboard and J. E. Zeublin, the chief at Philadelphia, both listening to us making "Rome howl"—a fifty word gait the whole night until clear. Then Mr. Kennedy would delight in saying: "Now, Fity, go up on Albany duplex and take Shelly. He has a few thousand words for the *Herald*." He would then quietly sneak in on another wire and tell Shelly to "rush" me. Those days I did not care how fast it came rolling in. The faster the better. I often wish for a repetition of them and have the speed I had then.

It is forty-eight years since I started out in the telegraph business (1863). In 1868 I was working in the Pacific & Atlantic office under general superintendent McCargo, of Pittsburgh, now deceased. S. B. Rumsey was manager at Philadelphia. We were in with the Franklin people at No. 45 S. Third Street. J. G. Smith was manager and P. B. Delany, chief operator of the Franklin Telegraph Company. James Shane, Edward Kearney and another man comprised the Franklin operating staff, and William Gove, James Nelson and myself the Pacific & Atlantic. I well remember the gold panic. I stood at the door of the office marking down the fluctuations on a blackboard, while Mr. Delany called out, but I could not hear on account of the noise from the crowd of watchers on the sidewalk. From Philadelphia I was transferred to Pittsburgh for the same company.

A month after the strike of 1870 I went with the Western Union and was placed on the old Western Press circuit where I took press from such "flyers" as O. A. Gurley, William Manning and Comb. Green at Cleveland. In those days press matter was relayed at Cleveland. Later Pittsburgh was hooked on to New York, Fred W. Baldwin, A. E. Sink and others being the senders. We were on a side repeater and had no chance to break. What we could not get was made up out of our heads. I copied the Franco-Prussian and Turko-Russian war news and it took some guessing and close watching of the New York dailies to get these outlandish Russian names properly spelled. When I left Pittsburgh to go South I was relieved by Jules Guthridge. That was forty years ago; it seems like yesterday. We copied everything with a stylus and took ten copies—twelve on Saturday nights. Typewriters were unknown then.

While in Pittsburgh, when it happened to be bad or rainy weather, we were often compelled to cut and relay everything from the West and East, and I was frequently ordered out of bed to help out. I often caught Charles Selden and others of the old Cincinnati crowd at the other end of our circuits; also Charles W. Hammond, William Spink and J. P. Cassidy at St. Louis; Charles Lithgow, William Wallace and Edward Whitford at the Chicago end, and so on. We did not let the grass grow under our feet, either. The wires we worked in those days would not or could not be worked by the present generation. There were no duplexes nor quadruplexes then, and all wires were of No. 8 and 9 gauge, iron. Most of those mentioned have since passed to the "beyond," but I hold their memories fresh in mind and will always have an admiration for them.

Sad Result of Wrong Delivery of a Telegram.—The delivery of a telegram to a man in Australia with the same name as the person for whom it was intended was the indirect cause of the loss of the man's life, together with that of his wife. The telegram was addressed to a man by the name of McKay, requesting him to come to Sydney at once as his mother was dying. The dispatch was delivered to another Mr. McKay whose mother evidently also lived in Sydney. He and his wife took a steamer for that place and the steamer was wrecked, all hands on board being lost.

The Old Guard.—A correspondent desires to know what is meant by the "old guard" in referring to New York members of the fraternity. Our understanding of the term is that it means those members of the profession who were employed in this city prior to January 1, 1880, and they will be regarded as the old guard until 1920 when the limit will be extended to include those employed in the city prior to January 1, 1890, or thirty years previous.

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - - - Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
R. J. WEEKS, Manager Advertising Department.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6657 Barclay

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.

November 16, 1911.

Character Building.

One of the most desirable possessions a human being can acquire is a good character. Such a character is a shining light amid the darkness and is admired by everyone; even those who are inclined to be evil-minded respect a man of character. A man with a good name is generally looked upon as a safe person to deal with; he is reliable and attentive to duty; if he makes a promise he keeps it, and he is generally trusted by his fellow men.

A good character, however, cannot be bought—it is beyond price—and the man who desires it must work for it by conducting himself in an honest and upright manner in all his dealings with his fellow men. Some men pretend to possess a good character and may fool themselves in the belief that they have it, but a man's opinion of himself amounts to nothing if it is not in accord with general opinion. It makes no difference what a man pretends to be, if he does not live his convictions he is a hypocrite — he does not practice what he preaches — and his real character is soon found out. Such a one cannot gain or possess the confidence of upright men—in other words his character is not good.

There is an infinite number of ways to build up a character, but at the outset it should be recognized that it cannot be reared on a false or imperfect foundation. The basis should be honesty, integrity, courage and zeal. Without the practice of these qualities a good character cannot be attained.

A man of good character is honest to himself and to those with whom he has social and business relations; he is attentive and punctual in his duties, and loyal to his friends and business associates—in short, he does for others what he would have them to do for him.

Duty to the employer is a necessary requisite in character building. When a man agrees with a telegraph or telephone company, for instance, to work for it at a stipulated remuneration, he obligates himself to render an equivalent in service. If he fulfills his obligations, and is honest and fair otherwise, he naturally falls in line as a candidate for better positions when men are sought to fill them.

It may surprise many to know that there are positions in the telegraph and telephone services to-day that are actually seeking men to fill them.

Loyalty to the employer and strict performance of duty are essential qualities in personal progress, and the man who makes this his life practice is sure to win in the end. Some men are prone to complain that their worth is not appreciated by their superiors. It is safe to say that in many instances they put too high a value upon their worth. Their work and deeds will determine their fitness, irrespective of what they think about it, and the man who is diligent, honest and wide awake and works for the interest of his employer as well as for his own, is the man who will succeed.

An upright character is therefore a most precious possession and he who would make substantial material progress should not lose sight of the underlying principles of such a character, viz.: fidelity, honesty and sobriety—fidelity to trust, honesty towards his fellow men and complete control of his grosser self.

The companies are constantly looking for men that they can trust implicitly, and he who has a good character back of him cannot always remain in the background.

Organization of Telephone Pioneers.

The telephone pioneers who met in Boston November 2 and 3 to organize an association have good reason to be proud of their work. The meeting was held under the most favorable auspices—the weather was delightful and the enthusiasm and good-feeling were unbounded. The programme was carried out exactly as planned and there was not the slightest hitch, from beginning to end, to mar the schedule and enjoyment.

The delegates felt especially grateful for the liberal entertainment provided for them by the American Telephone and Telegraph Company and the New England Telephone and Telegraph Company and they enjoyed every minute of their time.

Dr. Bell's remarks at the afternoon session were delivered in a very entertaining manner, and he captivated his audience from the start. He was not under any restraint so he talked to the delegates—his children, they might appropriately be called—in an easy, conversational manner, such as he would employ in talking to intimate friends in his own drawing room. His re-

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marks were full of interest, and being in his own family, so to speak, he told many interesting stories and facts in connection with his early work on the telephone that are not generally known.

The primary purpose of the association is to promote fellowship among its members and in the attainment of this object it has the active and moral support of the most distinguished telephone men in the country. The head of the greatest telephone organization in the world will be the guiding hand of the association during the first year of its existence and no doubt the organization will feel the effect of his wise counsel and active encouragement, and develop into a power for good.

Telegraph Monuments.

From time immemorial men have erected monuments to record notable deeds and achievements in human progress, so that successive generations might know what their ancestors had done. The great pyramids of Egypt, and the Washington and Bunker Hill monuments in this country are examples.

At the present time the erection of two monuments of particular interest to the telegraph world is being carried into execution. One of them is to be located at Berne, Switzerland, to commemorate the founding of the International Telegraph Union, and the other at Harriman (formerly Turner), N. Y., to commemorate the sending of the first telegraphic train order. Both of the events to which these monuments are to bear witness for generations to come have resulted in incalculable benefit to civilized nations, the first by facilitating telegraphic intercourse between the nations of the world and the second by rendering railroad travel expeditious and safe. The chief point of difference between the two projects is that the former is international in character, while the latter is virtually a national movement. The purpose of both, however, is the same, i.e., to furnish a permanent record of the genesis and growth of a great achievement. Stone and bronze are always employed to form such records because they are the most substantial and enduring materials we know of.

In our issue for November 1 we give an illustration and description of the Berne monument, and the Turner monument has been described and referred to in these columns throughout the past year. An illustration of the tentative design was published some months ago, and the accepted design for the bronze tablet for the monument was illustrated in the issue for October 1.

Mr. J. E. Riley, manager of the Western Union Telegraph Company, at Bloomington, Ind., writes: "I think TELEGRAPH AND TELEPHONE AGE is one of the most adapted to the craft of any paper I ever read. I think the correspondence school feature is alone well worth the price of a subscription. I shall certainly recommend it to my associates."

Early Telegraphy in La Porte, Ind.

At a recent meeting of the La Porte County Historical Society at La Porte, Ind., Alfred Weller, of Chicago, Ill., and Charles E. Weller, of St. Louis, Mo., both old-time telegraphers, read papers on the early days of telegraphy in La Porte. The two brothers were former residents of La Porte and were well qualified to discourse on the subject.

Mr. C. E. Weller left the telegraph service in 1870, and spends his summers with his brother Alfred on the old homestead at La Porte. They are both among the earliest of living telegraphers.

Mr. Alfred Weller gave a brief account of the early days of the telegraph in the West, and referred to the Speed Telegraph Company, organized in 1847 by Colonel J. J. Speed, the line being erected along the Michigan Central Railroad. Mr. Weller was the first messenger at Marshall, Mich., being then eleven years of age. The one wire between Detroit and Chicago carried all the business between the East and the West and there was plenty of spare time for the operators to talk and joke among themselves over the wire. In those days a coil of wire and a pair of pliers in the hands of a telegraph operator entitled him to free transportation on the railroad.

Mr. Weller handled election returns in 1848 for the first time, and the people of Marshall were greatly enthusiastic over the fact that the returns were received by telegraph. Mr. Weller received an ovation for his work. The paper was deeply interesting throughout.

Mr. Charles E. Weller followed his brother Alfred with a paper similar in character. He, also, was a messenger in the Marshall office, entering the service at the age of seven years, when Alfred was promoted to be an operator. He told in an interesting manner how he, too, became an operator. In the winter of 1856 Mr. Weller received the first train order that was sent over the wire between La Porte and South Bend, Ind. His last service on the Lake Shore was in the office of Charles Minot who had been appointed from the Erie Railroad to be resident manager of the Lake Shore Railroad.

Both papers were well written and received appreciative compliments.

Trip of Electrical Engineers to Panama Canal.—It is proposed by the Board of Directors of the American Institute of Electrical Engineers to arrange a trip of inspection to the Panama Canal Zone during the coming winter. The excursion will be made on the steamers of the United Fruit Company, sailing from New York and New Orleans.

Well-Sustained Wire Communication.—An authority states that wire communication in the United States is well sustained. We think so too. It requires 35,000,000 poles to sustain our wire facilities.

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Organization of the Telephone Pioneers of America.

Amid the utmost goodfellowship and enthusiasm over 200 telephone pioneers organized the association of "Telephone Pioneers of America" at Boston, Mass., November 2, in the presence of the distinguished gentleman whose invention made the association possible—Dr. Alexander Graham Bell—and many others of distinction in the telephone field.

The meeting was held at the Hotel Somerset, and the weather during the two days was bright and pleasant. Through the courtesy of the New England Telephone and Telegraph Company and the American Telephone and Telegraph Company, liberal entertainment was provided and excellently carried out, and the first meeting of the pioneers will long remain as a pleasant memory in the minds of those who participated.

At 11 a. m. November 2 Mr. Thomas B. Doolittle called the meeting to order. On motion of Mr. Angus S. Hibbard, General Thomas Sherwin, chairman of the board of directors of the New England Telephone and Telegraph Company, Boston, was appointed temporary chairman, and Mr. Henry W. Pope of New York, temporary secretary.

In taking the chair General Sherwin made a few remarks, dwelling upon the development of the telephone industry and warmly approving the organization of the pioneers. He spoke of the many difficulties that they had overcome in the past, and, in closing, welcomed the association to Boston—the birthplace of the telephone.

Mr. H. W. Pope, after thanking the pioneers for their assistance in the preparatory work of organization, read the draft of the constitution. It was considered by sections and finally adopted unanimously.

The name of the association as set forth in the constitution is the "Telephone Pioneers of America," and the association is formed "for the purpose of recalling and perpetuating the facts, traditions and memories attaching to the early history of the telephone and telegraph system; preserving the names and records of the participants in the establishment and extension of this great system of electrical communication; the promotion, renewal and continuance of the friendships and fellowships made during the progress of the telephone industry between those interested therein, and the encouragement of such other meritorious objects consistent with the foregoing as may be desirable."

On motion of Mr. Hibbard the chairman appointed a nominating committee, naming as members Messrs. Carl T. Keller, of Boston, Mass.; J. E. Farnsworth of Dallas, Tex.; W. R. Abbott of Chicago; C. E. Scribner of New York and J. Robb of New York. On the recommendation of the committee the following-named gentlemen were unanimously elected officers for the first year: President, Theodore N. Vail; vice-presidents, F. H. Bethell, W. T. Gentry, E. B. Field and B. E. Sunny; secretary and treasurer, Henry W. Pope. Executive committee: T. D. Lockwood, J. J. Carty and F. A. Houston.

General Sherwin then, in the absence of President Theo. N. Vail, surrendered the chair to Vice-president W. T. Gentry, who assumed the position with a few appropriate remarks.

The by-laws were then read and adopted.

Letters of regret at their inability to be present were read by Secretary Pope from Messrs. E. J. Hall, New York; C. A. Gates, Dallas, Tex.; Charles Selden, Baltimore, Md.; G. Y. Wallace, Salt Lake City; Robert J. Morgan, New York; G. D. Leverett, New York; G. D. Milne, New York; E. H. Lyon, New York; Frank B. Knight, Dallas, Tex.; Union N. Bethell, New York; Thomas A. Edison, Orange, N. J., and others.

The secretary was authorized to make suitable acknowledgments of these letters, also to the New England Telephone and Telegraph Company, and the American Telephone and Telegraph Company, for courtesies extended the delegates.

The condolences of the association were extended to Mr. Charles R. Truex of New York on the recent death of his son, and the meeting then, at 12 o'clock, adjourned.

The afternoon session was called to order by Vice-president W. T. Gentry, who asked Mr. A. S. Hibbard and Mr. Melville Egleston, of New York, to escort to the platform Dr. Alexander Graham Bell, Mr. Frederick P. Fish, former president of the American Telephone and Telegraph Company, and Mr. Thomas D. Lockwood, general patent counsel. As these gentlemen were conducted to the platform they were given a rousing reception.

Vice-president Gentry then introduced Dr. Bell, who made an extremely interesting address, in which he told many facts in connection with his early work in the development of the telephone. Dr. Bell's address is given in full on other pages of this issue.

Dr. Bell was followed by Mr. Frederick P. Fish, former president of the American Telephone and Telegraph Company, who made an interesting address which referred largely to Dr. Bell's personality and his work.

Referring to the pioneers' association, Mr Fish said: "There were a great many great men in the early days in the telephone business. I will not name them; we all know who they were. But I do not doubt that at that time there was not one name which would have come right to the front, if any one in the business, or any one outside the business who knew anything about it, had been asked to name the man who was doing the most direct, definite and effective work for the promotion of this enterprise. One name would have come to the lips immediately; and, by great good fortune of the company, by the great good fortune of the men in the company, by the great good fortune of the world, that man after a period of rest, during which he grew more and more broad, increased his power and capacity to a marked degree, has come back into the saddle to carry on under vastly better conditions and with infinitely more power and strength of purpose the work of development with which he began so far back in the pioneer days of this sys-

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tem. We are all to be congratulated that Theodore N. Vail (applause) has had exactly the career he has had and that he came back as he did; and we are to be congratulated on the personality of the man, for he is a leader whom every one will love and follow, because he has the right kind of cordial regard and respect for every man who works with him."

At the conclusion of Mr. Fish's remarks, Mr. Thomas D. Lockwood of Boston made an address in his characteristic style.

"This is going to be a good society," he said. "It is something that was very much needed from the outset—certainly very much needed in the last year or two. We did at one time have an association called the National Telephone Exchange Association, which was organized with certain vague ideas of mutual improvement, and especially of advancement in the telephone business; but as the business went on and as the representatives of telephony gradually learned that standardization was necessary, that it was not possible for every man in every one of the different cities and towns of the United States to have a different sort of a system and a different sort of a switchboard and different kinds of apparatus, that Exchange Association, especially with the maturing of engineering forces in the different companies, grew to be rather a social organization, one in which the greatest good was attained not by the meetings, but by the interchange of conversation and the attrition of views between the members.

"I am sure that there is not going to be a dissenting voice when I say that we are very much indebted indeed to Messrs. Pope, Treux and Doolittle, in whose minds this association first took form, and especially to Mr. Pope, for the assiduity and ability with which he has brought it to this point and gathered so many representative men together." (Applause.)

Mr. Lockwood spoke of his early experiences in telephony; how he became interested in the work and how he became employed by the National Bell Telephone Company.

"I am very glad that I came with the company," he continued, "and that I have stayed with the company, and I am very proud today of my thirty-two years continuous service."

In closing his address Mr. Lockwood said: "I have not said anything about the numerous and wonderful changes in organization or in many other respects, because that has been a little out of my line; but I do want before I close to express on behalf of every one, if you will allow me, the pleasure of seeing Professor Bell here today. (Applause.) It has given some of you an opportunity which you never had before of seeing and hearing him both, which I am sure which you will regard all your lives long as being a very great privilege. His present fame as the inventor of the electric speaking telephone is universally recognized, and is secure; and in this respect he is fortunate and happy, since to comparatively few it is given to be fully appreciated while they remain on the scene. But we are assured that this fame is imperishable, and that it will continue and become more firmly established by the lapse of years, and the passage of time; since millions of telephones in America, and as many more millions in the rest of the world are, not mute, but speaking witnesses to the fact, already attested by time, truth and the courts, that they, each and all, trace their genesis to our fellow member, Alexander Graham Bell." (Applause.)

The meeting then adjourned. The time and place of the next meeting will be determined by the executive committee.

ATTENDANCE.

Aberdeen, S. D.—J. L. W. Zietlow.

Albany, N. Y.—W. B. Butler, W. B. Eddy, E. B. Rogers.

Atlanta, Ga.—W. T. Gentry.

Atlantic City, N. J.—C. B. Smith.

Boston.—A. M. Allen, J. F. Anderson, T. B. Bailey, J. C. T. Baldwin, J. H. Barry, G. A. Beale, F. J. Boynton, A. N. Bullens, W. J. Burden, C. B. Burleigh, J. Burns, J. K. Butler, F. A. Buttrick, G. W. Conway, W. J. Denver, R. W. Devonshire, A. M. Dittmar, G. H. Dresser, W. R. Driver, H. B. Emery, J. H. Flanagan, J. A. Gately, C. J. Glidden, C. A. Grant, E. K. Hall, C. H. Herzig, R. B. Hopkins, F. A. Houston, H. S. Hyde, A. W. Ives, W. J. Keenan, C. T. Keller, J. N. Keller, J. C. Kilday, T. J. Killian, C. W. Lane, E. E. Lillie, N. W. Lillie, T. D. Lockwood, W. E. Lockwood, T. F. Long, E. M. Longley, J. A. McCabe, C. G. McDavitt, A. A. McDonald, H. McDonald, J. F. Oderman, C. A. Perkins, E. W. Pierce, G. W. Pierce, C. W. Pitman, L. J. Shay, General T. Sherwin, E. M. Surprise, C. T. Thompson, A. W. Tuttle, F. E. Waring, F. E. Warner, C. F. West, E. S. Willard, C. J. H. Woodbury, I. O. Wright.

Branford, Conn.—T. B. Doolittle.

Bridgeport, Conn.—G. E. Betts.

Bridgeton, N. J.—S. H. Meyers.

Brookline, Mass.—F. P. Fish.

Brooklyn, N. Y.—D. W. Adee, J. F. Canfield, T. P. Fitzpatrick, John O'Rourke.

Buffalo, N. Y.—C. W. Mackenzie, J. J. Martin.

Chicago, Ill.—W. R. Abbott, A. P. Allen, R. Cline, F. B. Cook, S. G. McMeen.

Cincinnati, Ohio.—R. T. McComas.

Cleveland, Ohio.—P. Yensen.

Columbus, Ohio.—H. E. Allen.

Dallas, Tex.—J. E. Farnsworth, M. F. Thomas.

Danbury, Conn.—G. W. Hoyt, S. P. Smith.

Denver, Col.—F. O. Vaille.

Derby, Conn.—W. N. Sperry.

Detroit, Mich.—W. J. Berry, W. A. Jackson.

Enosburg Falls, Vt.—C. L. Ovitt.

Elmira, N. Y.—F. E. Smith, F. L. Teese.

Fitchburg, Mass.—F. E. Bowker.

Galesburg, Ill.—T. S. Brown.

Hartford, Conn.—N. W. Brown, E. A. Smith.

Hyannis, Mass.—A. T. Stuart.

Jamestown, N. Y.—J. W. Stearns.

Jersey City, N. J.—J. T. Blake, H. Boutillette, J. F. Murphy, P. T. Reilly.

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Kansas City, Mo.—H. J. Curl, W. W. Johnson, C. W. McDaniel.
Lawrence, Mass.—F. G. Cheney.
Leominster, Mass.—F. E. Kinsman.
Lowell, Mass.—H. A. McCoy, J. Menzies, M. G. Parker, T. E. Parker.
Mineola, N. Y.—C. F. Kelleher.
Minneapolis, Minn.—E. B. Baker.
Montreal, Que.—C. F. Sise.
Mount Vernon, Ohio.—R. N. Litton.
Nashua, N. H.—F. L. Towey.
Nashville, Tenn.—L. Hume.
New Bedford, Mass.—W. K. Wagner.
New Haven, Conn.—E. W. Abbott, T. N. Bradshaw, E. N. Clarke, C. B. Doolittle, C. N. Dow, A. H. Embler, E. H. Everit, H. Kraft, J. W. Ladd, T. M. Lawrence, F. P. Lewis, H. T. Lohmes, E. S. Marsh, J. T. Moran, E. Y. Pittman, G. S. Pond, W. L. Ronald, G. E. Stannard.
New London, Conn.—E. C. Ford.
Newport, R. I.—W. A. Wright.
New York.—G. C. Allen, C. R. Bangs, H. G. Bates, V. M. Berthold, W. L. Candee, A. S. Campbell, J. J. Carty, T. Dusenbury, M. Egleston, J. M. Ferry, C. H. Fuller, J. J. Ghegan, W. Graham, F. W. Harrington, J. F. Hathaway, A. S. Hibbard, A. E. Holcomb, E. T. Holmes, W. E. Huntington, S. C. Ingalls, B. A. Kaiser, N. C. Kingsbury, J. E. Knetzer, J. L. McQuarrie, L. A. Madden, G. T. Manson, S. H. Marriott, E. L. C. May, W. J. Morgan, Jr., W. R. Newton, W. B. Perkins, F. A. Pickernell, T. E. Piggott, Henry W. Pope, F. Powell, C. W. Price, C. A. Randall, W. L. Richards, James Robb, F. C. Ross, A. L. Salt, J. Schock, N. J. Schultz, C. E. Scribner, R. H. Starrett, H. L. Storke, W. I. Sweet, J. B. Taltavall, T. R. Taltavall, H. B. Thayer, M. A. Thomson, G. K. Thompson, P. W. R. Van Wyck, C. H. Wilson, J. D. Ellsworth.
North Adams, Mass.—W. F. Orr, W. H. Stedman.
Northampton, Mass.—A. Proctor.
Northeast, Pa.—J. N. Culbertson.
Oklahoma City, Okla.—P. Kerr-Higgins.
Orange, N. J.—H. G. McCully.
Oswego, N. Y.—M. Joyce.
Pawtucket, R. I.—W. E. Esten.
Philadelphia, Pa.—D. R. Gibbs, F. W. Griffin.
Pittsburg, Pa.—J. H. Boeggeman, A. K. Dement, P. G. Reynolds.
Portland, Me.—J. D. Stanford.
Providence, R. I.—I. B. Carpenter, C. P. Howard, H. D. Kenyon, G. F. McDonald, A. McLellan, F. H. Peckham.
Quincy, Mass.—J. F. Hyland.
Salem, Mass.—R. P. Butterick, S. F. Smith.
Salem, Ohio.—J. K. Stitt.
Somerville, Mass.—J. A. McCoy.
Springfield, Ill.—O. S. Morse.
Springfield, Mass.—F. G. Daboll, W. F. Hunt, M. Hutchins, A. McAulay, C. A. Nichols.
Steubenville, Ohio.—H. T. Sapp.
St. Louis, Mo.—J. K. Wass.
Syracuse, N. Y.—W. W. Nicholson.
Toledo, Ohio.—A. J. Mellen.
Uniontown, Pa.—D. J. Murphy.
Utica, N. Y.—C. A. Nicholson, F. G. Wood.
Washington, D. C.—A. G. Bell, A. P. Crenshaw.
Westfield, N. J.—W. H. Bush.
Youngstown, Ohio.—J. P. McGahan.

ENTERTAINMENT.

In the afternoon of Thursday, November 2, the ladies of the party were entertained at the Hotel Somerset by readings by Grace Sanborn Cole, and in the evening the entire party attended the performance of "The Three Romeos" at the Colonial Theatre.

In the morning of Friday, November 3, the members visited the main exchange of the New England Telephone and Telegraph Company, special cars being provided to convey them from the hotel.

After luncheon the delegates were photographed in front of the hotel and at 2 o'clock an automobile ride was taken to Lexington, Concord and other historic points in the vicinity of Boston. Each car was decorated with blue pennants bearing the seal of the pioneers' association in gold. On the return to the hotel there was a demand for these pennants as souvenirs, and the supply was soon exhausted. It is the intention of the Entertainment Committee, however, to mail a pennant to each delegate.

THE BANQUET.

At 7:30 o'clock the banquet was held in the main hall room of the hotel, and it was a most delightful affair and a fitting conclusion to the highly successful and interesting meeting. The large room was brilliantly lighted and decorated on all sides with American flags festooned and looped up in a very artistic manner. At the side of the room opposite the main entrance hung a blue silk banner of the association trimmed with gold. It bore the seal of the association and the dates 1875 and 1911, and underneath were the words "Welcome to Boston," all in gold. Beneath the banner was placed a flag with the coat of arms of Massachusetts. The banner, and the state coat of arms, together with the national colors, formed a very pretty and striking picture.

The seating arrangements were carried out in an excellent manner. Each delegate had a printed list indicating the table at which he was to be seated, and as each of the tables was easily identified by means of large numbers hung on standards, the guests were enabled to go right to their seats without any confusion.

During the dinner an orchestra in the balcony rendered excellent music and a quartette of male voices interspersed vocal pieces with pleasing effect.

At the conclusion of the dinner stereopticon views were thrown upon the screen illustrating the development of the telephone industry and many incidents in connection therewith.

Letters of regret were read from Mr. Theo. N. Vail, Mr. E. J. Hall, Dr. Alexander Graham Bell, Mr. F. P. Fish and Mr. E. M. Barton at their unavoidable absence from the banquet.

During the dinner the party sang various songs written by Mr. A. S. Hibbard and adapted to popu-

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lar airs, and at the conclusion Auld Lang Syne and patriotic airs were sung by the entire assemblage. There was an entire absence of formality at the banquet, and the enjoyment of the affair was complete.

Much regret was expressed at the absence of Mr. Theo. N. Vail, as his presence was looked upon as being necessary to complete the purpose of the gathering. With Dr. Bell and Mr. Vail present, the entire history of the telephone would have been personified. The banquet was tendered by the American Telephone and Telegraph Company.

A banquet was given to the ladies in the main restaurant concurrently with that given to the delegates, at the conclusion of which they joined the men and were present at the close of the festivities. As the party passed out of the banquet hall each person was presented with a metal model of the original Bell telephone as a souvenir of the occasion. These models were made by the Western Electric Company.

NOTES.

The local reception committee received much praise for the able manner in which it performed its special duties. It consisted of Messrs. W. J. Denver, chairman; A. N. Bullens, secretary; E. K. Hall, E. W. Longley, C. T. Keller, G. H. Dresser, F. P. Valentine, I. O. Wright, F. W. Story, J. H. Barry, T. E. Parker, N. W. Lillie, T. J. Feeney and Henry McDonald.

Mr. A. N. Bullens was in charge of the registration and information bureau at the Hotel Somerset and he was highly complimented for his unselfish devotion to the cause.

The New England Telephone and Telegraph Company and the American Telephone and Telegraph Company generously provided the services of stenographers, writing materials, postage stamps and local and long distance telephone service free to members and guests.

The members received a neat little pamphlet giving a brief outline of points of interest along the route of the automobile ride to Lexington and Concord Friday afternoon. It was historical in character and very helpful in identifying the principal points as they came into view.

Badges were handed to the members after they had registered their names in the association roster. The badges were made of blue satin ribbon with the association's triangular seal pendant from a loop, below which the words "Boston, Mass., Nov. 2-3, 1911" were printed in gold. The pin was of unique design. The name of the delegate was inscribed in a panel, above which the word "Hello" was stamped out of the metal and the word "Speaking" likewise cut out underneath the panel, thus reading

"Hello
John Jones
Speaking"

The seal is triangular in shape and of gilt metal. Along the three edges are the words "Telephone Pioneers of America," and in the center of the triangle is the familiar telephone blue bell with the figures 174,465 (the number of the original Bell patent) on the rim.

EXHIBITS.

A very interesting exhibit was made of historical documents, apparatus and models at the back of the convention hall.

Mr. E. T. Holmes of New York made a very extensive display of early telephone subscribers' lists in the principal cities, photographs of early apparatus, exchanges, circulars, announcements, etc. The names of the subscribers were in each case all contained on one sheet.

Mr. Holmes also distributed large cards containing an illustration of the original telephone exchange switchboard (Boston, May, 1877) together with a facsimile reproduction of a letter from Mr. Thos. D. Lockwood, dated August 5, 1884, asking for the loan of this historical board for exhibition at the International Exhibition of Electricity. On another card were facsimile reproductions of the first printed lists of telephone subscribers in the cities of Boston and New York.

Mr. J. J. Ghegan, of New York, distributed among the delegates a facsimile reproduction of the directory of the Newark Telephone Exchange, Newark, N. J., dated May 1, 1879. Mr. Ghegan was then manager of the Exchange.

The New England Telephone and Telegraph Company made a very complete exhibit of historical apparatus, prints and a large variety of documents pertaining to early telephone work. Parts of Dr. Bell's original telephone of 1875 and various other pieces of early apparatus were shown, together with illustrations of the same complete. A showcase contained many articles and documents of great historic interest and two large panels set against the wall held various instruments, transmitters, receivers, switchboards, etc., illustrating the refinements which have taken place since the early days. The New England company also showed interesting models of short lengths of sleet-laden wire cut from a telephone line in Boston after a snow, rain and sleet storm on February 1, 1898. The wire was encased in a mass of ice 3⅝ inches in diameter, the whole weighing 3.2 pounds per foot.

Campaigning by Telephone.—Several society women in Brooklyn, N. Y., utilized the telephone very liberally in electioneering in behalf of a Brooklyn candidate for the Supreme Court. It is stated that they sent in over 100,000 telephone calls in carrying on this work.

Telephony in Russia.—Telephone connection between St. Petersburg and Berlin is under the consideration of the Russian Post and Telegraph Administration. The Russian Administration of Posts and Telegraphs has applied for powers to lay an additional telephone line between Moscow and St. Petersburg.

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PIONEERS OF THE TELEPHONE.

THE organization of the Telephone Pioneers of America in Boston November 2 and 3, was successfully effected and much enthusiasm and good feeling characterized the first meeting. In this issue we present the portraits of many of the pioneers. It was our original intention that each portrait should be accompanied by a brief biographical sketch of the subject, but on account of the number and importance of these records, we have been compelled owing to space limitations to depart from the original plan and adopt the one herewith carried out, reserving for future issues the individual use of engravings and sketches in full. In our issue for November 1 we presented full page photogravure pictures of Dr. Alexander Graham Bell and Mr. Theodore N. Vail. The pictures here presented include many of those who assisted in the development of the telephone industry.

ANGUS S. HIBBARD,
Advisory Relation Executive Department, American Telephone and Telegraph Co., New York (1881).

HENRY W. POPE,
Special Agent, American Telephone and Telegraph Co., New York, and Secretary Telephone Pioneers of America (1877).

THOMAS B. DOOLITTLE,
Retired, Branford, Conn. (1877).

CHARLES R. TRUEX,
Special Agent, American Telephone and Telegraph Co., New York (1879).

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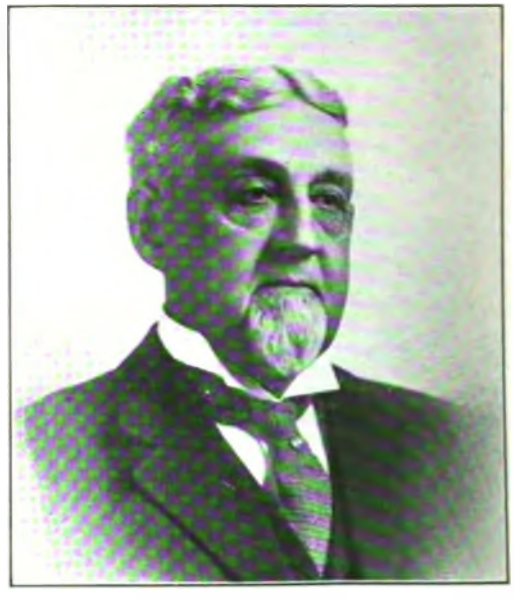
U. N. BETHELL,
Vice-President American Telephone and Telegraph Co., President New York Telephone Co., President Bell Telephone Co. of Pennsylvania, New York (1888).

B. E. SUNNY,
President Chicago, Central Union, Michigan State, Wisconsin and Cleveland Telephone Co.'s and Vice-President American Telephone and Telegraph Co., Chicago (1879)

W. T. GENTRY,
President Southern Bell Telephone and Telegraph Co., Atlanta, Ga. (1879).



CASPER E. YOST,
President Iowa Telephone Co., Nebraska Telephone Co., Northwestern Telephone Exchange Co., Omaha, Neb. (1889).

J. T. MORAN,
Vice-President and General Manager, Southern New England Telephone Co., New Haven, Conn. (1884).

E. B. FIELD,
President The Mountain States Telephone and Telegraph Co., Denver, Colo. (1880).

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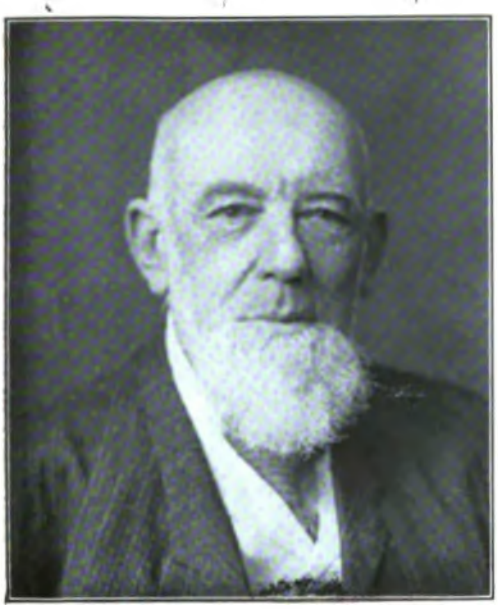


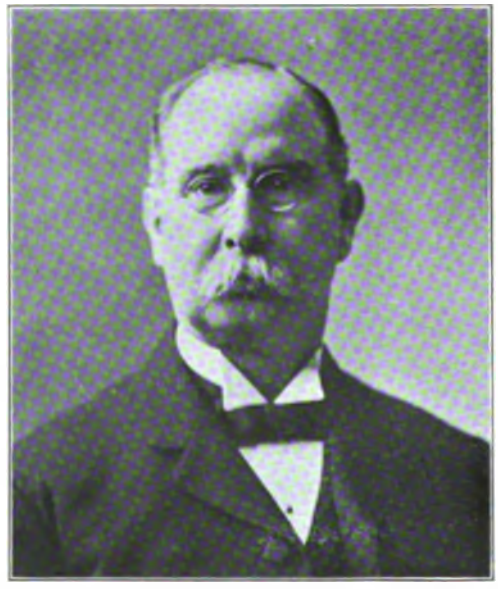
HENRY S. HYDE,
Vice-President New England Telephone and Telegraph Co., Brightwood, Mass. (1879).

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

E. M. BURGESS,
General Manager, The Mountain States Telephone and Telegraph Co., Denver, Colo. (1881).

J. C. VAIL,
Assistant Treasurer, American Telephone and Telegraph Co., New York. Retired (1880).

E. T. HOLMES,
President Holmes Electric Protective Co., New York (1877).



E. S. WILLARD,
Assistant Treasurer, New England Telephone and Telegraph Co., Boston, Mass. (1879).

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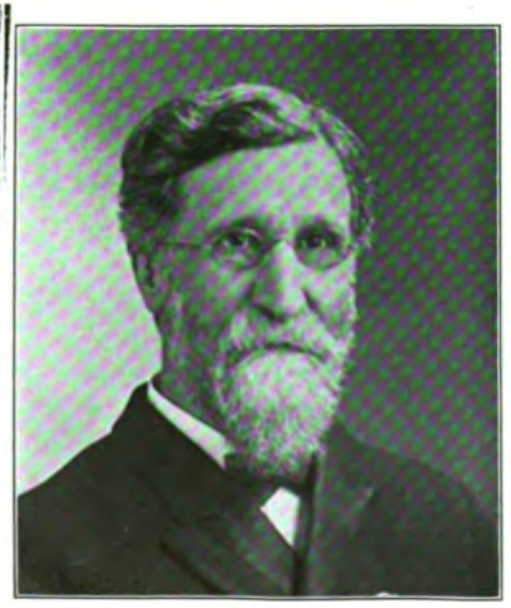
W. L. CANDEE,
President The Okonite Co., New York (1877).

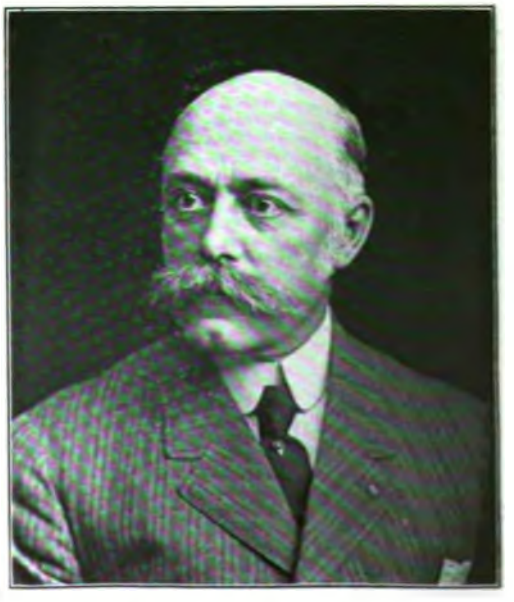
JOHN J. GHEGAN,
President and General Manager, J. H. Bunnell & Co., New York (1877).

GEO. T. MANSON,
General Superintendent, The Okonite Co., New York (1879).

J. R. WILEY,
Western Manager, Standard Underground Cable Co., Chicago, Ill. (1878).



GEORGE COLTON MAYNARD.
Curator, Division of Technology, U. S. National Museum, Washington, D. C. (1877).



THOMAS COMMERFORD MARTIN,
Secretary National Electric Light Association, New York (1877).

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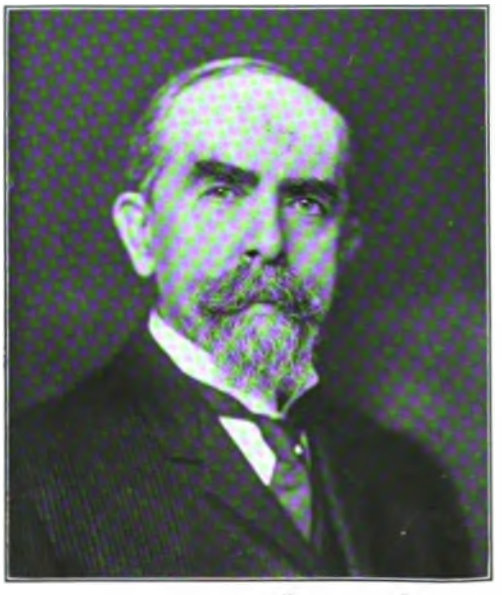
ROBERT CLINE,
General Construction Superintendent, Chicago Telephone Co., Chicago, Ill. (1889).

GEORGE D. MILNE,
Assistant Treasurer, American Telephone and Telegraph Co., New York (1879).

T. J. DWYER,
Superintendent of Plant, Northwestern Telephone Exchange Co., Minneapolis, Minn. (1881).

THOS. H. WADLAND,
Division Plant Superintendent, Bell Telephone Co. of Canada, Hamilton, Ontario (1878).

JAMES WILLIAM WILSON,
Assistant General Commercial Superintendent and Assistant Secretary, Pioneer Telephone and Telegraph Co., Arkansas City, Kan. (1885).



RICHARD O'BRIEN,
District Traffic Supervisor, Western Union Telegraph Co., Scranton, Pa. (1877).

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A. S. CAMPBELL,
General Supervisor of Lines, American Telephone and Telegraph Co., New York (1885).

THOMAS DUSENBURY, JR.,
Adjuster, New York Telephone Co., Paterson, N. J. (1883).

P. T. REILLY,
Special Inspector of Plant and Station Equipment, New York Telephone Co., Newark, N. J. (1887).

WILLIAM RICHARD EVANS,
Inspector, Bell Telephone Co., Toronto, Ontario (1878).

J. O'ROURKE,
Chief Foreman Construction, New York Telephone Co., Brooklyn, N. Y. (1881).

W. I. NOYES,
Manager, New England Telephone and Telegraph Co., Lewiston, Me. (1880).

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B. A. KAISER,
Commercial Department, American Telephone and Telegraph Co., New York (1885).

E. W. LONGLEY,
Auditor and Comptroller and Secretary New England Telephone and Telegraph Co., Boston, Mass. (1881).

FRED. J. BOYNTON,
Chief Traveling Auditor, New England Telephone and Telegraph Co., Boston, Mass. (1881).

ANDREW JAMES MELLEN,
District Commercial Manager, Central Union Telephone Co., Toledo, Ohio (1883).

H. A. McCOY,
Division Superintendent of Plant, New England Telephone and Telegraph Co., Lowell, Mass. (1883).

JASPER N. KELLER,
President New England Telephone and Telegraph Co., Boston, Mass. (1879).

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H. W. WILDER,
Plant Department, Southern Bell Telephone and Telegraph Co., Atlanta, Ga. (1881).

THOMAS J. KEECH,
Subscribers' Representative, Michigan State Telephone Co., Ann Arbor, Mich. (1881).

P. W. O'BRIEN,
Manager, Missouri and Kansas Telephone Co., Leavenworth, Kans. (1879).

WILLIAM STAFFORD HAYS,
Division Equipment Supervisor, Central Union Telephone Co., Columbus, Ohio (1881).

JAMES H. MEHAFFEY,
Special Agent, Delaware and Atlantic Telephone and Telegraph Co., Wilmington, Del. (1878).

JOSEPH D. STANFORD,
Traveling Auditor, New England Telephone and Telegraph Co., Lewiston, Me. (1879).

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CHARLES J. GLIDDEN,
Retired, Boston, Mass. (1877).

F. E. KINSMAN,
Retired, Leominster, Mass. (1876).

G. Y. WALLACE,
Retired, Salt Lake City, Utah (1883).

M. J. JOYCE,
Retired, Detroit, Mich. (1877).

W. T. WESTBROOK,
Special Agent Delaware and Atlantic Telegraph and Telephone Company, Philadelphia, Pa. (1878).

WILLIAM A. CHILDS,
Retired, New York (1877).

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J. T. BLAKE,
District Inspector, New York Telephone Co.,
Jersey City, N. J. (1882).

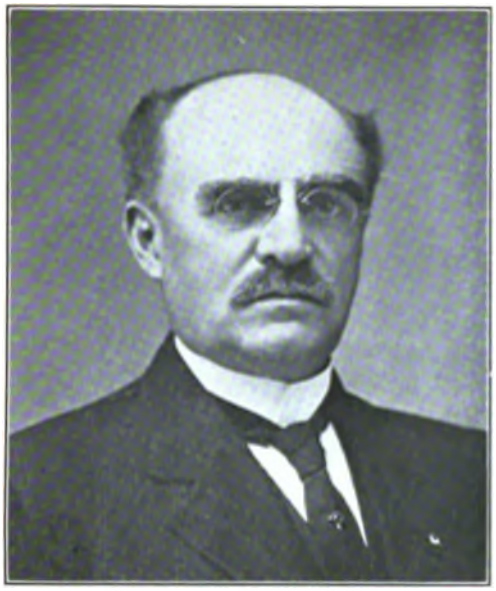
W. F. TAYLOR,
Assistant General Foreman, Oswego District, New York Telephone Co., Oswego, N. Y. (1888).

J. W. STEARNS,
New York Telephone Co., Jamestown, N. Y. (1879).

JOHN C. PEATY,
Supervising Foreman, New York Telephone Co.,
Brooklyn, N. Y. (1881).

N. MILLER,
Local Manager, Bell Telephone Co., Prescott, Ont. (1884).

JOHN P. MURPHY,
Chief Line Foreman, Bell Telephone Co.,
Philadelphia, Pa. (1883).



W. E. HUNTINGTON,
Special Agent, Commercial Department, New York Telephone Co., New York (1882).

FRANK B. KNIGHT,
Special Agent, Southwestern Telegraph and Telephone Co., Dallas, Texas (1880).

C. W. McDANIEL,
General Commercial Superintendent, Missouri and Kansas Telephone Co., Kansas City, Mo. (1879).

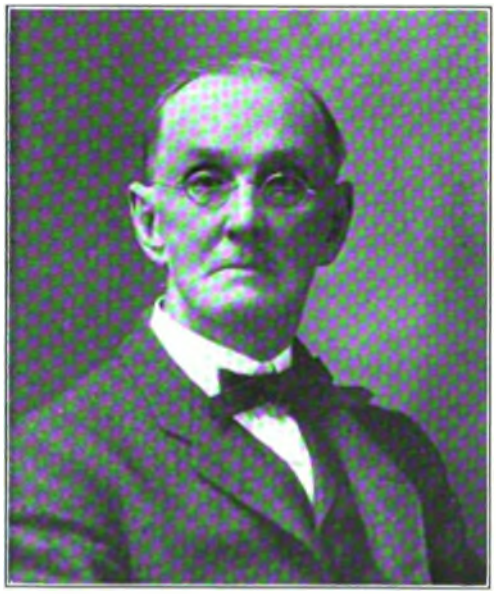
W. R. ABBOTT,
General Commercial Superintendent, Chicago Telephone Co., Chicago, Ill. (1889).

DANIEL M. ADEE,
New York Telephone Co., New York (1878).

AUGUSTUS PEMBERTON CRENSHAW,
Assistant Secretary and Treasurer, The Chesapeake and Potomac Telephone Co., Washington, D. C. (1878).

THOS. NESBITT,
Special Agent, New York Telephone Co., New York (1880).

EDWARD A. WOELK,
Special Agent, Bell Telephone Co. of Missouri, Belleville, Ill. (1878).



D. M. CLOWER,
Special Collector of Toll and Pay Stations, Dallas, Texas (1881).

CECIL W. MACKENZIE,
Right of Way Agent, New York Telephone Co., Buffalo, N. Y. (1879).

DAVID J. MURPHY,
District Manager, Central District and Printing Telegraph Co., Uniontown, Pa. (1881).

E. A. HUSSEY,
Head Counter Agent, New York Telephone Co., New York (1887).

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C. E. McCLUER,
Manager Branch Office, Western Union Telegraph Co.,
Norfolk, Va. (1876).

NOAH H. HUTTON,
Manager, Central Union Telephone Co., Richmond, Ind. (1885).

B. J. THROOP,
Local Manager, Bell Telephone Co., Hamilton, Ontario (1881).

NATHAN WARREN BROWN,
District Plant Chief, Southern New England Telephone Co.,
Hartford, Conn. (1882).

THOMAS S. BROWN,
District Commercial Manager, Central Union Telephone Co.,
Galesburg, Ill. (1884).

ROLAND N. LITTON,
Manager, Central Union Telephone Co., Mt. Vernon, Ohio (1880).

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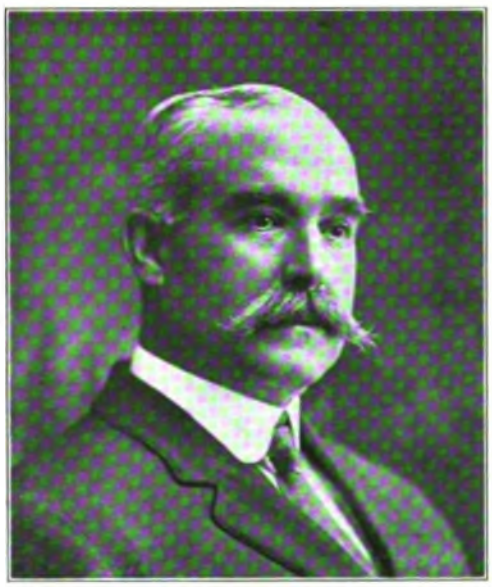
CLARK KENDALL FRASER,
Chief Foreman, Equipment Installation, New York Telephone Co., Buffalo, N. Y. (1880).

D. H. FITCH,
Electrician, Cazenovia Telephone Co., Cazenovia, N. Y. (1879).



THOMAS P. FITZPATRICK,
Supervising Foreman, Long Island Division, New York Telephone Company, Brooklyn, N. Y. (1879).

PETER GORDON REYNOLDS,
Superintendent of Construction, Central District and Printing Telegraph Co., Pittsburgh, Pa. (1881).

MILARD FILLMORE THOMAS,
Special Agent, Plant Department, Southwestern Telephone and Telegraph Co., Dallas Texas (1879).

CHARLES J. BYRNE,
Superintendent of Maintenance, Bell Telephone Co. of Missouri, St. Louis, Mo. (1879).

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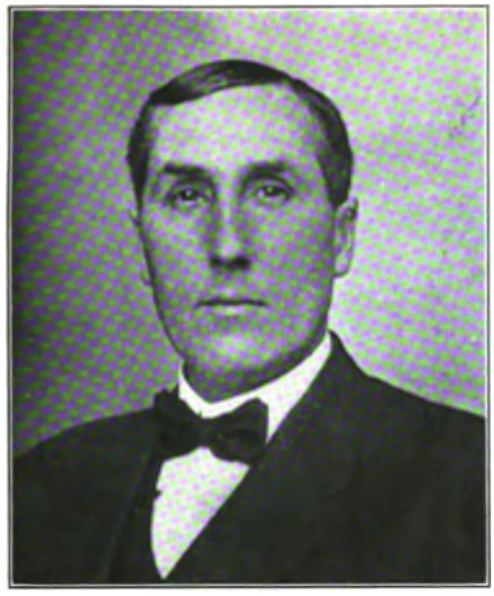
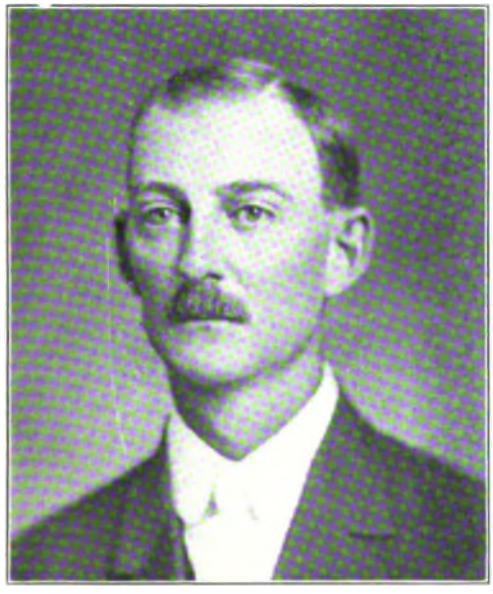


J. K. STITT,
Local Manager, Central District and Printing Telegraph Co.,
Salem, Ohio (1883).

G. S. TULLOCH,
District Plant Superintendent, Western Union Telegraph Co.,
San Francisco, Cal. (1887).



R. B. COCHRAN,
District Commercial Manager, Missouri and Kansas Telephone Co.,
Hutchinson, Kansas (1884).

W. B. EDDY,
Special Agent, New York Telephone Co., Albany, N. Y. (1879).

H. J. CURL,
General Contract Agent, Missouri and Kansas Telephone Co.,
Kansas City, Mo. (1888).

MISS SUE HOFFMAN,
Traffic Chief, Southeast Missouri Telephone Co.,
Sikeston, Mo. (1884).

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The Birth of the Telephone.*

Mr. Chairman and Gentlemen: This is a great day for me—the first meeting of the Telephone Pioneers of America and of the world. It gives me great pleasure to meet with you all today; and, yet, there is a feeling of sadness about it. I am the first telephone pioneer, and my memory goes back to the very beginning; and I miss the faces I remember so well, the faces of the old pioneers, whom I wish were here today. The Association is fortunate and the telephone system of America is fortunate that one of these old pioneers is at the head of matters today—Mr. Theodore N. Vail (applause), that great organizing mind that presides over the destinies of the telephone system of America. (Applause.)

I feel it a little presumptuous upon my part to try to speak of the telephone to telephone men. (Laughter.) You have all gone so far beyond me! Why, the little telephone system that I look back upon—what is it compared to the mighty system that goes through the whole extent of our country today? It is to you that this great development is due, and I feel that it behooves me to speak very modestly of the little beginning that led to this great end. I cannot tell you anything about the telephone. I cannot speak to you about undulating current, intermitting current and pulsatory current. I belong to the past, you belong to the present; and it occurs to me that perhaps the most useful feature of my address today might be to call to your minds some of the notable events of the past that preceded the commercial organization and development of the telephone. That is a matter upon which I can give information; that is the point on which many of you may be weak. You know all about many of the later developments; you may not be so familiar with the earlier ones.

The period that marks the incipiency of the telephone was the years 1874 to 1877. It was in 1877 that the telephone really began its commercial career. I shall leave the time after that period to my friend, Mr. Lockwood, and shall deal chiefly with the points that preceded 1877. Of course, in dealing with this period of the history of the telephone I shall have to be somewhat personal, for it all centered upon me in those days.

From 1873 until the beginning of 1876 I was a resident of Salem, Massachusetts, and came into Boston every day for my professional work. Then I would spend my summer vacations in Canada, at Brantford, at the home of my parents. So these three places—Salem, Boston and Brantford—are concerned in the early days of the telephone. Boston is *par excellence* the home of the telephone, for it was here that all the apparatus was made and where the important experiments went on. Brantford, in Canada, was my thinking place, where I would go and spend my summer holidays and look over the line of experiments that had been made in Boston and plan for the future. I generally went to Brantford about the middle of July, stayed there during the summer and was back in Boston the first of October.

And so it happened that in the summer of 1874, during my visit to my father's house in Brantford, Ontario, considering myself and discussing with my father the numerous experiments I had made in Boston relative to the reproduction of musical sounds by electricity for the purposes of multiple telegraphy, the thought of the membrane telephone was elaborated. So that the conception of the telephone originated in Brantford, Ontario, in the summer of 1874. You are all familiar with it. It was practically the same instrument that was shown in the patent that is marked upon our little memento here. It was a theoretical conception of a magneto telephone, a very daring conception, if I may be allowed to say so—that the vibrations of the voice might create electrical impulses like the aerial impulses, and produce an audible result at the other end. To tell you the truth, as a practical man, I did not quite believe it; as a theoretical man, I saw a speaking telephone, but theoretically we had the means of transmitting and reproducing speech in distant places. But it really seemed too good to be true that you could possibly create electrical impulses that would amount to any practical purpose by the action of the voice itself.

And so, on my return to Boston in October, 1874, and all through that winter and through the spring of 1875, instead of making the apparatus and trying it I was trying to devise methods of increasing the strength of these electrical undulations. I was working at what is now known as the variable resistance method. That is shown very well in a letter that I wrote to Mr. Hubbard on the fourth of May, 1875, when I was experimenting on the passage of a voltaic current through a vibrating wire, with the idea that the variation of tension in that wire, by producing variations in the resistance of the circuit, would produce the electrical undulations that I desired.

From the summer of 1874 until June 2, 1875, the development of the telephone was delayed by this thought, that the magneto-electric impulses would not be sufficient by themselves and would require a battery current.

Then came the discovery, with which you are all probably familiar, that a magneto-electric current would produce by itself sonorous effects at a receiving station and you may remember the plucking of reeds that went on that celebrated June 2, 1875. In a moment all the difficulties in the way of the practical solution of the telephone disappeared, and orders were given at once to construct the membrane telephone that was conceived in Brantford in 1874. When it was first tried it was somewhere about the end of June or July 1, 1875. We have present records of experiments on July 1, 1875, and I well remember these experiments. We had only one membrane telephone, and the receiver was one of the old tuned reed receivers. It was held up to the ear. You crammed the armature against the ear to dampen its vibrations. I was listening at that armature while Mr. Thomas A. Watson, my as-

*Address of Dr. Alexander Graham Bell before the Telephone Pioneers of America, Boston, Mass., November 2.

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sistant, was down in the basement of Charles Williams, Jr.'s, building, 109 Court Street, shouting at the end of the telephone, and then we changed places. I may say that I heard nothing. Then Mr. Watson went downstairs to listen, and I went upstairs to speak, and while I was speaking Mr. Watson came rushing up the stairs in a state of great excitement, saying, "Why, Mr. Bell, I heard your voice very distinctly, and could almost understand what you said." (Laughter.) Well, that was gratifying, but it would have been still more gratifying if I could hear that, too. You see, Mr. Williams' workshop was a very noisy place. Mr. Watson was accustomed to that noise and could hear a good deal better than I. I was more accustomed to throwing out my voice than Mr. Watson, so that he had the advantage of me in hearing and I had the advantage of him in speaking. The results would be considered very unsatisfactory at the present time; yet, encouraged by the results, poor as they were, I went ahead immediately to prepare specifications for a patent. In September, 1875, I was at work upon the specifications of the now celebrated patent. In October, 1875, the patent was completed. But it was not filed in October, 1875. A long delay ensued, because I was so imbued with an idea of the value of this great invention that I was not satisfied to take out patents for America alone—I must take them out for every country on earth. But that, you know, required money, and I did not have the money. Mr. Saunders and Mr. Hubbard, who were associated with me and carried on my experiments, paid the cost of my experiments and of the American patent. They were too wise to touch foreign patents. So I had to go ahead and see what I could do to get this great patent taken up abroad, and that caused great delay. I went up to Canada to interview friends in Canada, and at last made an agreement with the Hon. George Brown, who was at one time Premier in Canada, that he and his brother, Gordon Brown, would take out patents in England, and perhaps other countries, on one condition—that I should not file my application for an American patent until I had word from them that it would not interfere with the applications abroad. And so it was that the American patent dragged on for months, until at last Mr. Hubbard just said a quiet word to my solicitors in Boston: "It is no use waiting longer for Mr. Brown; just you put in the patent." And the patent was filed without my knowledge or consent. It is very fortunate that he did so. It saved a great deal of trouble and interference in the patent office, and so forth, and that is the patent on which the whole telephone system of the United States has been based.

I think it might be well to speak of a few of the more important points. The patent was filed February 14, 1876; it was granted March 3, 1876. I was in Washington at the time when it was allowed. I know it was allowed on March 3, 1876, because that happened to be my birthday, and it came to me as a sort of birthday present.

After the granting of the patent came a period of publication, and I want to speak now of a very curious thing. In the case of new inventions we are generally led to believe that the public is ready to swallow anything, but that grave scientific men are the most skeptical of all. I found just exactly the opposite to be true in the case of the telephone. The public generally and the business men of the country were very slow to perceive any value in the telephone. The scientific world, on the other hand, took it up at once. My first paper upon the subject was delivered here in Boston before the American Society of Arts and Sciences on May 10, 1876. Then I was invited to lecture before the Society of Arts at the Institute of Technology, on May 25, 1876. Then came a very notable event, which I shall speak of very slightly, although it really forms the basis for the knowledge by the world of the telephone. It was the Centennial Exhibition, in 1876. Mr. Hubbard and Mr. Saunders, who were financially interested in the telephone, wanted this instrument to be exhibited at the Centennial Exhibition. In those days—and I must say even up to the present time I am afraid to say it is true—I was not very much alive to commercial matters, not being a business man myself. I had a school for vocal physiology in Boston. I was right in the midst of examinations. My pupils, those studying under me, were studying to become teachers of the deaf, teaching speech to the deaf, and I could not be bothered at that time by having to go to Philadelphia and attend the exhibition. However, we found, in connection with the exhibition, that all the apparatus involving a necessity for quiet was to be examined on Sunday, June 25; and so it was urged that Sunday would interfere less with my professional pursuits than another day. I agreed, therefore, to go down and spend Sunday, and no longer. I could not possibly stay any longer than that while in the midst of my examinations. So I went down to Philadelphia, growling all the time at this interruption to my professional work, and I appeared in Philadelphia on Sunday, the 25th. I was an unknown man and looked around upon the celebrities who were judges there, and trotted around after the judges at the exhibition while they examined this exhibit and that exhibit. My exhibit came last. Before they got to that it was announced that the judges were too tired to make any further examination that day and that the exhibit could be examined another day. That meant that the telephone would not be seen, for I was not going to come back another day. I was going right back to Boston.

And that was the way the matter stood—when suddenly there was one man among the judges who happened to remember me by sight. That was no less a person than His Majesty Dom Pedro, the emperor of Brazil. I had shown him what we had been doing in teaching speech to the deaf in Boston, had taken him around to the city school for the deaf and shown him the means of teaching speech, and when he saw me there he remembered me and came over and shook hands and said, "Mr. Bell, how are the deaf mutes of Boston?" I said they were very

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well and told him that the next exhibit on the programme was my exhibit. "Come along," he said, and he took my arm and walked off with me—and, of course, where an emperor led the way the other judges followed. (Laughter.) And the telephone exhibit was saved.

Well, I cannot tell very much about that exhibit, although it was the pivotal point on which the whole telephone turned in those days. If I had not had that exhibition there, it is very doubtful what the condition of the telephone would be today. But the emperor of Brazil was the first one to bring that situation about at that time. I went off to my transmitting instrument in another part of the building, and a little iron box receiver—you probably all know what it was from diagram—was placed at the ear of the emperor. I told him to hold it to his ear, and then I heard afterwards what happened. I was not present at that end of the line. I went to the other end and was reciting, "To be or not to be, that is the question," and so on, keeping up a continuous talk. I heard afterwards from my friend, Mr. William Hubbard, that the emperor held it up in a very indifferent way to his ear, and then suddenly started and said, "My God! it speaks!" And he put it down; and then Sir William Thomson took it up and one after another in the crowd took it up and listened. I was in another part of the building shouting away to the membrane telephone that was the transmitter. Suddenly I heard a noise of people stamping along very heavily, approaching, and there was Dom Pedro, rushing along at a very un-emperor-like gait, followed by Sir William Thomson and a number of others, to see what I was doing at the other end. They were very much interested. But I had to go back to Boston and couldn't wait any longer. I went that very night.

Now, it so happened there, that although the judges had heard speech emitted by the steel disc armature of this receiving instrument, they were not quite convinced that it was electrically produced. Some one had whispered a suspicion that it was simply the case of the thread telegraph, the lovers' telegraph, as it was known in those days, and that the sound had been mechanically transmitted along the line from one instrument to the other. Of course, I did not know about it at that time; but when the judges asked permission to remove the apparatus from that location I said, "Certainly, do anything you like with it." But I could not remain to look after it; they had to look after it themselves. My friend, Mr. William Hubbard, who had kindly come up from Boston to help me on this celebrated Sunday, the 25th of June, said he would do his best to help them out, although he was not an electrician. He knew nothing whatever about the apparatus, beyond being in my laboratory occasionally, knowing me well. But he undertook to remove this apparatus and set up the wire under the direction of the judges themselves. So they had an opportunity finally of satisfying themselves that speech had really been electrically reproduced.

Sir William Thomson's announcement was made to the world in England, before the British Association, and the world believed—and from that time dates the popular interest in the telephone.

That was the 25th of June. Of course, the judges and others were anxious to know whether this thing would operate on a long line. Experiments had been made from one room to another in a building; but that was not quite as satisfactory as having one telephone in one place and another in another a hundred miles off. So I was asked whether I would venture to try the instrument between Boston and Philadelphia. Well, I, in my ignorance of the conditions, said, "Of course, yes." So when I went to Boston I began to consider, "Now, what are we going to do? These instruments are only prepared for short circuits." So we began to make experiments in Boston to fit the instrument for use on a longer line. I knew that we must have many turns of quite fine wire in the instrument; so I had such instruments constructed, and then the Atlantic & Pacific Telegraph Company in Boston kindly lent me the use of their wires for experiment. On July 7, July 9 and July 12, 1876, attempts were made to use the telephone upon various circuits from Boston to New York, from Boston to Rye Beach, and other places, but, unfortunately, with poor success. We did not get any vocal sounds on these circuits, although with two instruments, one in one room and another in another room of the Equitable Building and a circuit to Rye Beach, we did get some audible effect. But still the results were unsatisfactory where the undulating current was employed. We tried the intermittent current. I had a parlor organ and made contact with New York and asked the operator to listen and see if he could hear anything. I played tunes on the parlor organ, and he was asked if he could hear anything, and he said, "Yes." "What was it?" "Yankee Doodle." He could hear tunes, but that was really the only result of importance obtained in those trials of July 7, 9 and 12, 1876.

Sir William Thomson was present at later trials, and I presented to him a telephone that we used on that occasion, and it was taken to England and bothered me exceedingly in telephone litigation at a subsequent time. The owners of my English patent had to disclaim everything that was shown in those instruments. But it fortunately happened that the receiving instrument was one of those old Centennial box receivers with the metallic lid, which in this case was one of ferro-type iron, and when I gave this instrument to Sir William Thomson I was afraid he would lose the armature, and so I had Mr. Watson catch the armature down at one point to the magnet, to hold it in place. Sir William just threw the whole thing into his trunk without taking it off, and when it arrived in England the armature, instead of being flat, was cocked up like that. Well, that saved the English patent. (Laughter.) Everybody got the idea that the vibration was from this cocked-up thing. The English patent showed the cocking up of the armature. When it finally came before the Supreme Court of

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England, when they were deciding the case, the thing looked rather slim, according to the English law. The shreds of the patent were there—nothing was left but the metallic diaphragm. But they made a very singular construction. They said, according to a very benevolent construction of the law, as they construed it that it did not interfere with the patent for metallic armature, and the patent was saved! (Laughter and applause.)

That brings me up to July 12, 1876. Then came my summer vacation of 1876. I went up to Brantford, Ontario; I prepared a whole lot of apparatus, telephones with coils of different kinds, high resistance coils and low resistance coils, long coils and short coils, and I carried them up with me to Brantford, Ontario, and continued attempts to get in touch with long distance lines. The Dominion Telegraph Company of Canada kindly lent me the use of its wires, and I look upon one experiment there as of very great importance. It was an experiment made in August, 1876. The transmitting instrument was in Paris, Ontario; the receiving instrument, the Centennial iron box receiver, was in Brantford, at a distance of eight miles from Paris; and the battery on the circuit was in Toronto, about sixty miles away. So we had a circuit of somewhere from sixty to seventy miles. The transmission went one way only, but speech was transmitted, and that was the first time speech was transmitted between persons at a distance of several miles. But it was only one way; the person at the other end could not reply, but had to telegraph back by another wire. But by August, 1876, quite a number of experiments that attracted attention were made on the wires of the Dominion Telegraph Company. There was one experiment between Brantford and Mt. Pleasant, a distance of about five miles, and then I gave an exhibition from my father's house at a country place four or five miles from Brantford, known as Tutelo Heights. It was about a quarter of a mile from the house to the nearest telegraph line. We got a lot of stove pipe wire, cleaned the town out of stove pipe wire, and took the wire on the fence from my father's house to the corner of the Mt. Pleasant road, and then attached it to the telegraph wire leading into Brantford. Then I had some friends in Brantford who spoke, sang and recited into the membrane telephone, while a large number of guests at my father's house at Tutelo Heights listened to the transmission; and on that occasion also three voices were transmitted simultaneously. I had three mouthpieces made for the membrane telephone and three persons sang to the same telephone.

So those experiments at Brantford were the first experiments that were really successful in transmitting speech from one place to another at a distance, but they were all one-sided, not reciprocal.

The first reciprocal communication occurred after my return to Boston in October, 1876. On October 9 occurred the first conversation by telephone between persons separated by miles of space. This was on the Walworth Manufacturing Company's line, connecting its factory in Cambridgeport with the office in Boston. It was not a very long distance, probably two and one-half miles, but free communication was carried on, and I think that was an historical occasion. Mr. Watson was at one end of the line and I was at the other, and we kept a record of what passed. I noted what I said and I noted what I thought I heard him say, and the parallel columns were reported in the newspapers, especially in the Boston Advertiser, October 19th. I think that was the first time that conversation had actually been carried on between two persons separated by miles of space. The space, however, was not great, only about two and one-half miles.

And so we went on during 1876 with experiments, trying to increase the distance at which results could be obtained. For that purpose the Cambridge Observatory offered its services. They had a private line from Cambridge to Boston for transmitting time signals from the Cambridge Observatory, and through Professor Rogers I had the use of that line at night, when it was not needed for time purposes. I had it connected with my laboratory and by night made experiments between the Cambridge Observatory and Boston, trying to ascertain the conditions fit for telephone service on long lines.

Then came a really noteworthy period of experiments on the lines belonging to the Eastern Railroad Company. An experiment was made on November 26, 1876, in which conversation was carried on between myself, in Boston, at the Eastern Railroad depot, and Mr. Thomas A. Watson in Salem. We had increased the distance to eighteen miles. Then we experimented on a line that led to North Conway, 143 miles away, so that Salem was a way station to North Conway. That was a very notable extension. It was determined that we should send a man to North Conway, and Mr. Watson went up to North Conway with a stack of apparatus, with all sorts of modifications. Now that we had a chance of trying it out on a 143-mile circuit we were determined to take advantage of it, if we had to spend all day and night on it. All sorts of apparatus was carried. I was in Boston and he in North Conway. I think that was really the most important experiment that had been made in connection with the free commercial stage. This experiment was on December 3, 1876, when we had a free communication between Boston and North Conway.

Then we tried varying the coils, trying small wire, thick wire, long coils, short coils, tried it with and without a battery; and as a result of the experiments we gave up the battery and took to the magneto telephone alone, in the laboratory.

That takes us up to the end of 1876. There is hardly anything more I can tell you about it before it came into commercial use. On January 13, 1877, I gave a lecture on the subject at the Philosophical Society in Washington. On January 31, 1877, there was an experiment here in Boston that attracted a good deal of attention at the time, although it did not compare with the other experiments in importance. It was a communication between the rubber

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shoe factory and the residence of Mr. Converse in Malden, but it attracted a great deal of public attention to the telephone. On January 21 there was a public exhibition on the line of the Eastern Railroad, in which no battery was used. Conversation occurred between Boston and Salem; and by and bye, at about that time, in the early part of 1877 or the end of the year 1876, a rather interesting circumstance took place. I had among my students at Boston University a young Japanese student named Tsawa. He came to me for the purpose of studying the pronunciation of English. Of course, when he heard about the telephone he became very much interested. He said, "Mr. Bell, will this thing talk Japanese?" I said, "Certainly, any language." He seemed very much astonished at that, and said he would like to try it. I said that he could try it, and he went to one end of the circuit and I stood at the other. He talked Japanese, and I reported the result to him. He asked if it talked Japanese. I said "It talked Japanese, but I couldn't quite understand it." (Laughter.) He was not quite satisfied with that, and asked permission to bring some Japanese friends of his from Harvard College. I said, "Certainly." He brought two young men there, and they talked through the telephone and listened; so that Japanese was the first foreign language that was spoken over the telephone. And these two Japanese gentlemen were exceptional men. I did not know who they were at the time, but years afterwards it was revealed to me. I was in Japan, in Yokohama, when the American residents in Japan were giving a banquet to the new Japanese Minister who was going to Washington, Mr. Kamura, now at the head of affairs in Japan. I was asked to attend the banquet, and instead of being introduced to Mr. Kamura he came up to me and said, "I don't require an introduction to Mr. Bell. I knew him years ago." And he turned out to be one of the Japanese students. Then I found out about the other one in a rather curious way. The Japanese Government sent to this country at the time of the Russian-Japan war Baron Kaneko. He came to Washington and gave a lecture before the National Geographical Society. I happened to be president of that society at the time. And so, when the dinner was over and the time for speaking came, Baron Kaneko said, "I knew Mr. Bell years ago," and he told his story about the use of the telephone. So those two men, the foremost men in Japan today, Baron Kaneko and Mr. Kamura, were the two men who heard the telephone in the winter of 1876-1877. (Applause.)

A few more words, and I shall have done. On February 12, 1877, I gave a lecture before the Essex Institute in Salem, Massachusetts, and the lines were connected with Boston. The speech was transmitted between Boston and Salem, and the audience generally could hear the sound of the speaker's voice, while those who came close to the telephone were able to converse with Mr. Watson in Boston. At the invitation of the Essex Institute this lecture was repeated on February 23, 1877, and admission was charged; and on this occasion a portion of the proceeds was presented to me for my lecture on the telephone. I immediately went into Boston and we had a little silver telephone made, and it is interesting now to look back upon the fact that that was made from the first money made from the telephone.

On that occasion a very interesting incident took place. A *Boston Globe* reporter had the brilliant idea that he would send a despatch to his paper in Boston by telephone, and on that occasion the first newspaper despatch ever sent by telephone was sent to Boston by the *Boston Globe*. That, I think, more than anything else, woke up the press of the world to the advantage of the telephone. That article in the *Boston Globe* was copied all over the world, and had a great influence in modifying public opinion.

On April 3, 1877, we talked perfectly freely between Boston and New York. On April 5, 1877, there was a lecture in Providence, Rhode Island, which was attended by a great many people, and speech was transmitted to Boston from Providence, and a bugler in Boston, who was well known in Providence, played, the sounds being heard all over the large hall in Providence.

On April 4, 1877, was opened the first telephone line, the first line specially built for telephonic purposes. It simply connected the office of Mr Charles Williams, Jr., in Boston, with his house. It was a short line, but it was the first of the hundreds of thousands of miles of telephonic wire that has since been laid.

New Books.

Elementary Telegraphy, by H. W. Pendry, New York, is a manual for students and was written especially to meet the requirements of the ordinary grade of the subject as published in the syllabus of the City and Guilds of London Institute. While the work is written from an English standpoint, as far as the practice of telegraphy is concerned, it contains much matter of general interest. The underlying principles of course are the same in any country, but in this instance they are set forth in a very clear manner. The American student of telegraphy will no doubt find this part of the book of special interest, as it explains many things that are not always stated very clearly in other books of like character.

The section devoted to telegraph instruments and practice will be of interest to those who care to look beyond the American shores in matters pertaining to telegraphy. It is well to know how things are done in other countries besides our own, and a study of this section will aid in broadening the mind.

A high telephone official states that TELEGRAPH AND TELEPHONE AGE is by far the most valuable paper for information and general telegraph and telephone news that reaches telephone people.

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

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(Continued from page 706, November 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 will be 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.

DECIMALS (*continued.*)

The denominator of a decimal fraction is 1 followed by as many ciphers as there are decimals

For example, to express .004 as a demical fraction, there are three decimal places, there therefore must be three ciphers after the 1 in the denominator, thus $\frac{4}{1000}$

The value of the successive decimal orders decreases tenfold from left to right and increases tenfold from right to left. Hence, the removal of a decimal figure one place to the right by removing the decimal point *decreases* its value tenfold and its removal one place to the left *increases* is value tenfold.

The value of a decimal is not changed by writing ciphers to the right of the last figure; .00100 is still $\frac{1}{10000}$.

To reduce a decimal to a common fraction:

RULE (1). *Omit the decimal point and supply the denominator, and then reduce the common fraction to its lowest terms.*

Example: Reduce .005 to a common fraction.

Supplying the denominator; $\frac{5}{1000}$.

Cancelling the common factor 5; $\frac{1}{200}$ Ans.

To reduce a common fraction to a decimal:

RULE (2). *Annex decimal ciphers to the numerator and divide by the denominator and point off as many decimal places in the quotient as there are annexed ciphers.*

Example: Reduce $\frac{8}{125}$ to a decimal:

Dividing 3000 by 125 gives 24. Three ciphers have been added to the numerator, therefor three decimal places must be pointed off, giving .024. Ans.

ADDITION OF DECIMALS.

To add decimals:

RULE (3). *Place the numbers to be added so that the decimal points will be directly under one another. Add as in whole numbers, and place the decimal point in the sum directly under the decimal points above.*

Example: Find the sum of 156, .36, 18.025, 1.005, 4, and 100.01.

Solution:

```
156.
  .36
18.025
 1.005
 4.
100.01
279.4   Ans.
```

SUBTRACTION OF DECIMALS.

To subtract decimals:

RULE (4). *Place the numbers so that the decimal points will be directly under each other. Subtract as in whole numbers and place the decimal point in the remainder directly under the decimal points above.*

Example: Subtract .234 from .3276.

Solution:

```
Minuend      .3276
Subtrahend   .234
Difference   .0936   Ans.
```

RULE (5). *When the figures in the decimal part of the subtrahend extend beyond those in the minuend, place ciphers in the minuend above them and subtract as before.*

Example: From 506.38 take 20.0004.

Solution:

```
506.3800
 20.0004
486.3796   Ans.
```

MULTIPLICATION OF DECIMALS.

To multiply decimals:

RULE (6). *Place the multiplier under the multiplicand, disregarding the position of the decimal points. Multiply as in whole numbers, and in the product point off as many decimal places as there are decimal places in both multiplier and multiplicand, prefixing ciphers if necessary.*

Example: Multiply .326 by .0003.

Solution:

```
Multiplicand   .326
Multiplier     .0003
Product        .0000978   Ans.
```

NOTE: As there are seven decimal places in the multiplicand and multiplier, four ciphers must be prefixed to the product.

DIVISION OF DECIMALS.

To divide decimals:

RULE (7). *Place the divisor to the left of the dividend and proceed as in division of whole numbers, and in the quotient point off from the left as many decimal places as the number of decimal places in the dividend exceeds those in the divisor, prefixing ciphers to the quotient if necessary.*

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Example: Divide .805 by .35.
Solution:

```
.35).805(2.3
   70
  105
  105
```

NOTE: There is one more decimal place in the dividend than in the divisor, therefore there is one decimal place in the quotient.

Example: Divide .625 by 25.
Solution:

```
25).625(.025  Ans.
   50
  125
  125
```

NOTE: There are three more decimal places in the dividend than in the divisor, therefore there must be three decimal places in the quotient, and a cipher must be prefixed.

(To be continued.)

Postal Telegraph-Commercial Pacific Cable to China and Japan.*

The Pacific cable of the Postal Telegraph-Commercial cable system was completed in July, 1903, and it has been in successful operation ever since. In 1906 further sections were added, extending it to China and Japan. The total length of the system is 10,008 nautical miles.

The laying of this great length of cable was the most difficult of submarine cable enterprises ever undertaken, the route followed being unique for its lack of natural stations, traversing as it does the greatest uninhabited waste of water on the globe.

The route has six great ocean stretches of 2,276, 1,332, 2,606, 1,631, 1,264 and 899 miles. On the first, between San Francisco and Hawaii, the mean depth is 15,000 feet with a maximum of 18,438; on the second, between Hawaii and Midway Islands, the mean depth is 12,000, the maximum 18,156; on the third from Midway Islands to Guam, Ladrone Islands, the mean depth is 15,600, with a maximum of 31,614, with sudden and great fluctuations; on the fourth, from Guam to Manila, Philippine Islands, the mean depth is 13,200, the maximum 20,400; on the fifth, from Manila to Shanghai, China, the mean depth is 8,754 feet, the maximum 13,800; on the sixth, from Guam, Ladrone Islands to Yokohama, Japan, the mean depth is 11,076 and the maximum 16,464 feet.

To bring home the significance of these immense depths in cable laying it may be explained that the amount of cable in suspension necessarily varies according to the depth and rate of paying out. In 17,400 feet, with the cable laying ship steaming at eight knots (about nine miles) per hour, no less than twenty-four miles of cable are in suspension in the water. Two and one-half hours are occupied in such case by any particular point in the cable from the time of leaving the ship to touching the ocean bottom.

*From *The Postal Telegraph.*

In the vicinity of the Pacific cable, near Guam, has been found the greatest ocean depth known anywhere, namely, the "Nero Deep," so named after the United States ship "Nero," from which the sounding was taken. A depth of 5,269 fathoms, or 31,614 feet, only 66 feet less than six statute miles, was found.

As isolated cable stations, the Midway Islands and Guam have a unique interest for the public. Midway Islands are two small islands situated half way between the United States and China coasts. They are surrounded by a coral reef of about eighteen miles in circumference. The reef protects the islands from the high seas. A rift in the reef admits vessels of eighteen feet draught into a deep and safe harbor. The "Wandering Minstrel" was wrecked here in 1887. Captain Walker, his wife and crew lived for fourteen months on the islands, subsisting on fish and the eggs of sea birds until they were rescued. The islands are under the jurisdiction of the United States Navy Department.

The Midway group is composed of two islands, the larger, called Sand Island, is 1¾ miles long by ¾ of a mile wide, and its highest elevation is 43 feet. It is composed of white coral sand and except for patches of shrub and coarse grass is barren of vegetation.

The smaller, called Eastern Island, is thickly covered with shrub and coarse grass, but is not a desirable place for habitation. It is infested with flies.

The cable station is established on Sand Island. Strange to say, this sterile sand heap in the middle of the ocean yields drinkable water at from four to seven feet from the surface.

The cable colony consists of a superintendent, a medical officer, operators, engineer, carpenter, Japanese laborers and Chinese servants. There are also two women in the colony, one being the wife of the superintendent and the other the wife of an operator, together with their three children. The live stock consists of two donkeys, a cat, 150 pigeons and eleven ducks, transported from Honolulu, and 151 chickens and two cows, which were raised on the island. During the year 1910 there was produced on the island for consumption 8,362 eggs, eighty-four chickens, fifty-two ducks and 1,029 squabs and two calves.

The colony is comfortably housed in modern commodious structures of steel and cement, and there is a tennis court of cement.

These Commercial Pacific cables are of vast importance to the United States commercially, politically and strategetically. They have increased the value and efficiency of the United States Navy, and enabled the government to keep in close touch with the military and civil authorities in the Philippines and they have strengthened the bonds between the United States and its possessions in the Pacific. American commercial interests in China and Japan have been kept up more closely by this quick communication. The old world empires of Asia are now able to communicate instantaneously with the new world of America.

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Report of British Postmaster-General.

The annual report of the British Postmaster-General for the year ended March 31, 1911, shows that 86,707,000 telegrams passed over the post-office wires as compared with 86,884,000 in the previous year. The total value of the telegrams was $13,866,330, an increase of $21,265 over 1909-10. On March 31, there were 11,451 post-offices open for public telegraph business as well as 2,423 offices at railway stations and other public places.

The use of high-speed automatic telegraph apparatus has been further developed during the year. The circuits between London and many of the larger provincial offices are now continuously worked with Wheatstone apparatus during the busy hours of the day. In connection with the Wheatstone apparatus on the London-Newcastle-on-Tyne and London-Edinburgh circuits, Creed instruments, printing in type, are being used. Gell keyboard perforators are extensively employed in connection with Wheatstone working, and other types are being tried. Baudot apparatus has been installed experimentally on the London-Birmingham circuit, and Murray multiplex apparatus on the London-Manchester circuit, and further trials of Undulator apparatus have been made between Bristol and Cork.

Experiments have been made with a view to the wider use of typewriters for the transcription of messages for delivery.

The main underground telegraph line between Birmingham and Bristol has been completed, as well as the extension from Leeds to Newcastle-on-Tyne. There is, therefore, now a triangle of underground lines with the corners at London, Birmingham and Bristol, with extensions from Bristol to Plymouth and Porthcurno, where submarine cables are landed; from London to Chatham; and from Birmingham to Glasgow and Edinburgh. Liverpool, Manchester, Leeds and Newcastle are served by cables connected with the main line at Warrington.

The number of foreign telegrams sent to and from the United Kingdom during the year (exclusive of certain telegrams dealt with entirely by cable companies) was 10,678,000, an increase of about 419,000 as compared with the preceding year. Quadruplex working with the Baudot type of instrument will shortly be permanently established on two of the Anglo-Netherland wires, and experimental trials in practical working with similar apparatus on a wire to Berlin are giving satisfactory results.

Wireless Telegraphy.—The number of radiotelegrams dealt with at the post-office coast stations during the year shows a satisfactory increase, the outward radiotelegrams to ships reaching a total of 5,640, as compared with 3,266 in 1909-10, and inward radiotelegrams from ships 34,161 as compared with 27,727 in 1909-10; the total increase being 8,808, or 28.4 per cent.

During a prolonged interruption of the Stornoway cable, the telegraph traffic was diverted to the wireless telegraph stations at Tobormory and Lochboisdale, and the delay and inconvenience which formerly attended the severance of the cable connection was successfully overcome. Returns of the traffic show that an average of 230 telegrams a day (the highest number in one day being 459) were transmitted by means of the wireless service with practically no delay.

Telephones.—The total number of telephone trunk line exchanges open at March 31 last was 678, compared with 643 at March 31, 1910. The capital expenditure at the same dates was £5,337,725 and £5,054,572 respectively; the number of conversations over inland trunk lines 30,100,068 and 26,566,318 respectively; the average payment per conversation 6.10d. as against 5.99d.; the gross revenue from inland calls £765,282 as compared with £662,845: and the receipts from Continental calls £24,666 and £24,135 respectively. During the year 137 post-office telephone exchanges were opened in the provinces—97 in England and Wales, 24 in Scotland and 16 in Ireland. The question of introducing a cheaper form of telephone service in sparsely populated rural districts is under consideration.

The following estimated figures show the extent to which the telephone is being used for sending messages for onward transmission as telegrams and express letters: Telegrams, 5,372,000, an increase over 1909-10 of 9.1 per cent.; express letters 196,000, an increase of 20 per cent. The number of messages sent to the post-office by telephone for onward transmission as ordinary letters decreased from 3,200 to 3,100, whilst the telegrams delivered during the year to addresses by telephone numbered 2,447,000, as against 2,154,000 in 1909-10. The number of telegrams delivered by telephone represented 3 per cent. of the total number of telegrams delivered.

Mileage of Wire.—The total mileage of post-office wires, including spare wires, on March 31, 1911, was as follows: Public telegraphs, 311,942; telephones, 660,144; private and leased wires, 267,009; total, 1,239,095. This length is apportioned as follows: Aerial, 440,815; underground, 787,553; submarine, 10,727; total, 1,239,095.

Quick Telegraphing to South America.—When the Argentine battleship "Rivadavia" was launched recently at Quincy, Mass., the telegraphic announcement was published in Buenos Ayres four minutes afterwards. This time was beaten, however, when the Argentine battleship "Moreno" was launched at Camden, N. J. On this occasion the news was known in Buenos Ayres in less than one minute afterward. The distance between New York and Buenos Ayres is approximately 7,000 miles, and is covered by submarine cable and a cable telegraph line over the Andes mountains owned by the Central and South American Telegraph Company. The average time of transmission of regular messages between New York and Buenos Ayres in only twenty-two minutes.

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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 aid to students by asking questions on these subjects in each issue of our journal, so that students may be encouraged to study 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 unfold the answers. This method of acquiring technical knowledge is a fascinating one.]

CHAPTER IX (*Concluded*).

Why is it necessary to reduce the tension of the spring on the No. 2 relay when the weather changes from dry to wet?

When the weather changes from wet to dry what alteration in the spring tension of the No. 2 relay will be necessary and why?

After a quadruplex has been balanced is it advisable to give the armature of the polar relay a bias?

What is the object of centering the armature of the polar relay?

What is the objection to giving a bias to the polar relay tongue?

What are the probable effects on the operation of the instrument of giving the polar relay armature a bias?

If the writing from B comes light on the polar relay does biassing the relay armature help matters any?

What steps should be taken if B comes light on the polar relay in order to remedy the trouble?

Sometimes it seems impossible to get a balance; what may be the reasons for this?

In locating the cause of such trouble how may the polar relay be tested?

How may the fingers be used in making such tests?

How is the neutral relay tested in order to ascertain its condition?

If the relay is defective, how will the trouble be manifested?

What is the effect when one portion of a coil is crossed with another portion of the same coil?

If a balance gives about twice the usual resistance, what is the trouble likely due to?

In case the current from the home battery does not reach the B station, what is the procedure to test for the trouble?

Why is a diagram of the connections helpful in a point-to-point test?

When quadruplex trouble is deep seated, what tests should be made to locate the cause of the trouble?

What precautions should be taken regarding local batteries and contact points in order to insure good working?

Dispensing With the Repeating Sounder.

BY J. P. FERRITER, DICKINSON, N. D.

In the instructions issued January 31, 1911, by the Western Union Telegraph Company, relative to the installation and operation of the Athearn quadruplex, I note the following paragraph:

"THE REPEATING SOUNDER.—Experiments indicate the possibility of being able to dispense entirely with the repeating sounder and of operating the local sounder direct from the front contact of the neutral relay. As the feasibility of doing so has not as yet been fully demonstrated, all neutral relays are now being furnished with front and back interchangeable contacts with a view to further trials in that direction."

It has long been a matter of wonder to me that the repeating sounder was not dispensed with long ago. I have demonstrated, to my own satisfaction at least, that the repeating sounder is as useless as a fifth wheel on a wagon.

I have at several different times, in an experimental way, operated a 500-mile quadruplex without a repeating sounder and I could not see that it made a particle of difference one way or the other, whether the repeating sounder was in or not. I did not, however, work it in the manner indicated in the paragraph quoted. I simply had the distant office reserve the long end and the tap on his transmitter; this gave me his signals reversed, and, by operating my sounder from the back contact points of my neutral relay, I received the signals as they were originally made.

I am at a loss to understand why this method is not adopted in preference to that of operating the local from the front contact as suggested.

A favorable point to be noted here is that when a single wire is repeatered into the common side of a quadruplex with this arrangement the short end of the battery is to the line while the single wire is idle and closed.

The Turner Monument Fund.

Several good sized contributions toward the Turner Monument Fund have been received by the treasurer since the previous published record. Mr. W. C. Brown, president of the New York Central Lines, New York, has sent his check for $10, and others who have contributed a like amount are Mr. James Merrihew, former general superintendent of the Western Union Telegraph Company, New York, and Mr. Ralph Peters, president Long Island Railroad Company, New York. Mr. Andrew Carnegie will contribute the last $500 toward the fund.

The contributions received up to date are as follows: Previously acknowledged, $1,676.99; James Merrihew, New York, $10.00; W. C. Brown, New York, $10.00; Ralph Peters, New York, $10.00. Total, $1,706.99.

Mr. C. M. Baker, division general superintendent of plant of the Postal Telegraph-Cable Company of Chicago, in renewing his subscription, writes: "TELEGRAPH AND TELEPHONE AGE like some other things we need improves with age."

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The Western Union Telegraph Company and Bell Telephone Company's Exhibit at the Western Pennsylvania Exposition, Pittsburgh.

The Western Union Telegraph Company and the American Telephone & Telegraph Company made a joint exhibit at the exposition of the Western Pennsylvania Exposition Society held at Pittsburgh, Pa., August 30 to October 21, inclusive. The accompanying illustration shows clearly the plan and scope of the exhibit, which occupied a space of 840 square feet.

At each corner of the exhibit space was erected a 20-foot telegraph pole to which were attached cross-arms and wires, and the rail enclosing the space consisted of short posts to which were attached stranded

EXHIBIT OF WESTERN UNION AND AMERICAN TELEPHONE AND TELEGRAPH COMPANIES AT PITTSBURGH, PA.

messenger wires and 60-wire cables. The floor covering was of green burlap and signs were liberally displayed, as shown in the illustration.

The Western Union exhibit consisted of a standard quartette table cut for typewriters and equipped with a full set of quadruplex instruments; a standard quartette table fully equipped with duplex instruments and a standard quartette table equipped with single Morse instruments, and relics of a telegraphic character which had been gathered from different sources.

There were also on exhibition a complete set of printer instruments, stock quotation transmitters, and tickers, all in operation, relays and pole changers for the printer system, a sub-master clock connected to a secondary clock, a standard switchboard, a complete McCullough call box system with five call boxes, all necessary tools and materials for the construction of a pole line, Wheatstone bridge testing sets, single sets of automatic repeaters, etc.

Among the relics shown were an old register, a relay and a hump-back key which were installed in the telegraph office at Rushfield, Ind., fifty years ago. These were loaned by Mr. George C. Hadley, the present Western Union manager at Mumford, N. Y.

The telephone company's exhibit consisted of two latest pattern telephone booths equipped with instruments, one private branch exchange switchboard and various styles of telephone instruments used in every day practice. There was also an exhibit of different kinds of lead-protected telephone cables in sizes from 10 pairs to 400 pairs.

During the rush hours of the afternoon and evening there was stationed at each entrance a neatly uniformed telegraph messenger who was supplied with a pole-counter. It was his business to count every person entering the exhibit space, and at the close of the exposition it was found that 23,405 people had visited and examined the various systems on exhibition. Fully 50,000 people were attracted by the display.

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The Railroad.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., and wife, were recent New York visitors.

Mr. James Kent, manager of telegraphs, Canadian Pacific Railway, Montreal, Quebec, recently made his annual inspection trip over the company's lines in the West. He was accompanied by Mr. B. S. Jenkins, of Winnipeg, general superintendent of telegraphs, Western lines of the Canadian Pacific.

Telegraphones on the Great Western. — The Great Western Railway is installing telegraphones on its line. Each of the principal stations along the road will be equipped with the apparatus, also the passenger and freight trains.

Dispatching on the Florida East Coast Railroad. —The Florida East Coast Railroad is planning to install a complete system of Western Electric telephone train dispatching equipment including forty-eight selectors to be used in signalling way stations, four dispatcher's equipments, together with ninety-six complete way stations and siding telephones. The district to be covered by the new telephone system extends from Jacksonville to Key West, Fla.

Telegraphones on Reading Road.—The Philadelphia & Reading Railway has installed the telegraphone between Shamokin and Wagontown. Telegraphones are also being installed on the Shamokin Division between Herndon branch junction and Cabel, and on the Lebanon Valley branch between Palmyra and Landis Siding. The company also proposes to make further installations of the telegraphone. Mr. C. M. Lewis is superintendent of telegraph, Reading, Pa.

Telegraphones on Chicago Great Western.— The Chicago Great Western Railway has recently installed on its eastern division two train dispatching telephone circuits and two local message telephone circuits. On the northern, eastern and southern divisions telegraphones are being installed at important points, and on the western division all trains are being equipped. Mr. G. O. Perkins is superintendent of telegraph of the Chicago Great Western Railway, Chicago, Ill.

Train Dispatching on the Louisville & Nashville.—The Louisville & Nashville Railroad, which is now operating over 2,200 miles of circuits by telephone, recently placed an additional order with the Western Electric Company for forty-two selectors to dispatch its trains over a new line to run from Lexington to Quicksand, Ky. The new line will cover a total distance of ninety-six miles, and the dispatcher for it will be located at Lexington. A message circuit will parallel the train circuit on this line and will be equipped with the same number of stations.

Telephone Train Dispatching Equipment. — The United States Electric Company, New York, has delivered to the Chicago, Rock Island and Pacific Railway the dispatchers and station equipments for a circuit of thirty telephone train dispatching stations. The Gill selector box outfits at the several stations are of the latest improved pattern. To the Gulf, Colorado and Santa Fe Railway the United States Electric Company has delivered twelve station selector outfits for telephone train dispatching with the local bell circuit, the dispatcher's apparatus equipment having provision for an extension of the circuit to twenty-four stations.

Mr. Keenan's New Duties. — Mr. Edwin C. Keenan, superintendent of telegraph of the Lake Shore and Michigan Southern Railway, Cleveland, Ohio, has been appointed jointly by Mr. W. W. Ryder, general superintendent of telegraph of railway companies, New York Central Lines, Chicago, and Mr. T. P. Cook, general superintendent Western Union Telegraph Company, Chicago, superintendent of telegraph, of the Lake Erie & Western, and Ft. Wayne, Cincinnati & Louisville Railroads, and the Northern Ohio Railway, with office at Cleveland, and will jointly represent these companies and the Western Union Telegraph Company. Mr. Keenan has also been appointed superintendent of telegraph of the Toledo & Ohio Central and Zanesville & Western Railways, with office at Cleveland, and will also jointly represent these companies and the Western Union Telegraph Company.

Telephone Train Dispatching on the "Katy."— Mr. W. H. Hall, superintendent of telegraph of the Missouri, Kansas & Texas System, has completed the construction of two telephone train dispatching circuits which have been in operation since October 1. On the Chattaw division the McAlester dispatcher handles the double track main line from McAlester, ninety-five miles south to Denison, Tex., with a part of the Oklahoma City line from Atoka on the main line, west to Coalgate, Okla. Way stations located at frequent intervals along the line are connected with the telephone circuit and on the single track sections the blind passing tracks are provided with booth telephones. The way station equipment consists of Gill selectors of the two-figure main-line bell type, together with the standard accessory apparatus. The Waco division circuit extends from Smithville, Tex., the dispatcher's office, 158 miles north to Hillsboro and includes forty-seven miles of the San Antonio line from the junction at Granger west to Austin. Thirty-four way telephone stations and nearly as many booth telephones are installed on the circuit.

The Late Isaac T. Dyer.

In the death of Isaac T. Dyer, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake City Railroad, at Los Angeles, Cal., October 25, the railway and commercial telegraph fraternity loses a member who was beloved by all who knew him. His nature was as gentle and sympathetic as a woman's, and he found much

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happiness in doing good to others—he did not live for self alone. His was a most lovable character and many of his associates have real cause to grieve over his death, which occurred in the prime of his career of usefulness. He was particularly endeared to his fellow-members of the Association of Railway Telegraph Superintendents, and they all without exception feel in his death the loss of a personal friend. The memory of Isaac T. Dyer will long live in the minds of those who were fortunate enough to come into contact with his kindly personality.

Meeting of Eastern and Western Divisions of Association of Railway Telegraph Superintendents.

Final arrangements have been made for the holding of a joint meeting of the Eastern and Western divisions of the Association of Railway Telegraph Superintendents in the General Office Assembly Room, Chicago and Northwestern Railway, Chicago, Ill., November 23 and 24.

The meeting will be called to order at ten o'clock a. m. November 23 and the following matters will be discussed and acted upon: Election of officers for the two divisions; handling Western Union reports and other similar business between railroad offices and the superintendent of telegraph by railway mail. This practice has recently been objected to by the Post Office Department and an expression from all members as to their instructions is solicited.

Information will be requested of such members as are prepared to furnish it on the following matters:

1. Number of maintainers or inspectors for a telephone train dispatching circuit or additional telephone message circuit or circuits; telephone mileage; frequency of train service and number of stations with and without selectors on each circuit.

2. Rate of pay for such maintainers or inspectors.

3. Expenses if allowed, and whether limited or unlimited.

4. Statistics as to the economy or saving in train operation or acceleration of train movement since the adoption of the telephone.

5. Retention in files of all telegrams as per order of the Interstate Commerce Commission, dated June 8, 1911, and what plans have been worked out for relieving the files of these cumbersome telegrams.

An invitation has been tendered and accepted to visit the plant of the Kellogg Switchboard and Supply Company, and transportation will be provided. Three o'clock p. m. November 23 has been fixed as the time and date for this visit instead of the date previously announced.

On November 24, after the morning session, the members will visit the Hawthorne plant of the Western Electric Company, where luncheon will be served, after which a trip through the works will be made. All members are earnestly requested to attend this joint meeting and to come prepared to discuss the subjects introduced.

Mr. Charles Selden, superintendent of telegraph, Baltimore & Ohio Railroad, Baltimore, Md., is chairman of the Eastern Division, and Mr. E. A. Chenery, superintendent of telegraph, Missouri Pacific Railway, St. Louis, Mo., is chairman of the Western Division.

Our Subscription Contest.

In our issue for September 1 we announced the opening of a subscription contest, offering five prizes amounting to $100 to those of our regularly appointed agents who sent in the largest number of new subscriptions during September, October and November and up to December 21. The prizes are as follows: First, $50; second, $25; third, $15, and the fourth and fifth, $5 each. The contest is limited to new subscriptions and renewals only. The total amount received from each agent on this account will decide the contest and in the event of a tie on any one prize, the prize will be divided.

This is an excellent chance for agents to earn a substantial amount of money not only by capturing a prize, but also from the usual commissions earned from the subscriptions sent in.

The contest is urged in the interests of our circulation, which we think ought to be very largely increased. Money must accompany all orders for subscriptions. 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.

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.

Our agents are showing great activity in the contest and new subscriptions are coming in in a satisfactory manner, but we desire a great many more before the contest closes. Every man in the telegraph business should be a subscriber, and there is a large field yet to be developed by our agents. Each one will find in his own territory many persons who are not subscribers, although they may be readers of occasional copies of TELEGRAPH AND TELEPHONE AGE. These should be singled out and argued with systematically and with judicious persistence. The strongest argument an agent can present to prospects is that the paper is educational and contains news and information that are worth many times the subscription price. Our instruction course in the elements of technical telegraphy, which began in the issue for October 16, is a technical education in itself, and could not be obtained for $25.00 elsewhere, yet this is given free to our subscribers.

Keep at it! If you do not capture your man today, try him to-morrow; he may be in a more receptive mood then; but keep at it.

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prevents errors and expedites traffic by saving the dispatcher's time.

The Gill Selector means better and safer service, with economy and satisfaction in operation and maintenance.

This Company will furnish the complete equipment.

UNITED STATES ELECTRIC COMPANY
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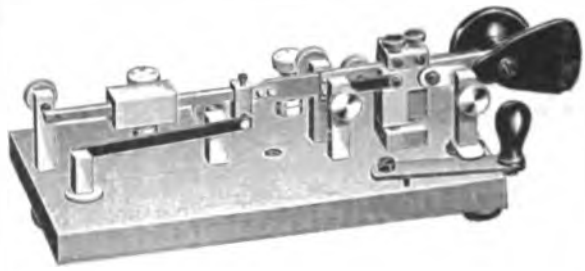
New Book on Telephony.

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



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Contains 16 chapters covering every branch of telephony.
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Has 700 illustrations of up-to-date apparatus and circuits.
Written for the practical telephone man, who has no time to study theory, but who is looking for practical instruction "how to do" things.
Tells how to locate and remedy trouble, line, instrument and switchboard.
How to make simple testing equipment and to use it.
All modern systems—both Magneto and Common Battery described and illustrated.
The whole subject is thoroughly covered, from the theory of magnetism to automatic and wireless telephony, including composite, harmonic and selective lockout systems.

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Telegraph and Telephone Age 253 Broadway, New York

The Barclay Printing Telegraph System

By WILLIAM FINN

For Practical Men

A comprehensive description of the construction and operation of the apparatus used in the Barclay Printing Telegraph System.
Printed on heavy coated paper and illustrated by 63 engravings. Forty-two pages of the same size as those of Telegraph and Telephone Age.

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Obituary.

Daniel F. Drawbaugh, who gained much notoriety several years ago through his claims as being the original inventor of the telephone, died at his home near Harrisburg, Pa., on November 3, at the age of 84 years. Mr. Drawbaugh was an inventor of considerable note.

Hiram Morse, aged 72, an old-time telegrapher, died in Detroit, Mich., October 22. He was employed on the Grand Trunk Railway for forty-five years, being superintendent of the Detroit division between 1875 and 1880. Deceased was retired four years ago.

Hugh W. Gillespie, aged 52 years, a well-known Boston operator, died at Winthrop, Mass., on November 1. He entered the service in 1873. Mr. Gillespie was a member of the Old Time Telegraphers' and Historical Association and several telegraph benevolent organizations.

J. T. Bivens, a former telegrapher and newspaper man of Washington, D. C., died in that city October 31. He entered the Confederate Army at the age of 14 years, and five years after the war entered the Signal Corps of the United States Army, serving as a telegrapher for a number of years.

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.]

(71) Q. Does the core of an electromagnet become fully magnetized the moment the current is turned on? K.

A. No; it requires time to magnetize a magnet core. This is partly due to self-induction in the magnet coils and partly to transient reverse eddy currents. The electromagnets of large generators often require ten minutes or more to "build up" their magnetization.

(72) Q. Is it true that Emperor Napoleon III. invented an electric battery? Please describe the battery. J. J. K.

A. Yes, it is true, but we are not aware that the battery was ever put into practical use. Both plates of the battery were of copper, one being immersed in dilute sulphuric acid and the other in cyanide of potassium, the liquids being separated by a porous cell.

(73) Q. What size wire is generally used for interior wiring of telephones? W. S.

A. No. 16 or No. 18 B. & S. gauge copper wire. In dry places weatherproofing office wire should be used and rubber-covered wire in damp places.

(74) Q. What is the meaning of the letters "E. B. B." used in connection with iron telegraph wire? R.

A. The letters stand for "Extra Best Best," which means that the wire so graded is of the highest conductivity, and is the most uniform in quantity, besides being tough and pliable.

(75) Q. What is the resistance of one mile of pure aluminum wire of No. 8 gauge? J. M.

A. 5.35 ohms.

Miscellanea.

Modern China.—The telegraph operators in China have gone on strike. With striking soldiers and striking operators the Chinese Government is having troubles of its own.

Teaching of the Sciences in the Schools.—Dr. Harvey W. Wiley, chief of the chemistry bureau of the Department of Agriculture, Washington, D. C., does not advocate teaching children the sciences in the public schools. They ought to be taught the dignity of labor, he says, and that the breaking of a promise is wrong.

Monopoly Charged.—A despatch from Washington states that petitions have been filed with the Inter-State Commerce Commission calling its attention to the "apparent purpose of the American Telephone and Telegraph Company to monopolize all wire facilities for wire communication to the destruction of competition and the possibility of low charges for the use of telegraph service."

Cincinnati Western Union Blue Book.—"The Seventh District Blue Book" is the title of a typewritten magazine gotten up in the office of the Western Union Telegraph Company at Cincinnati, Ohio. Its mission is to disseminate news and information between the officials and employes. It is well executed and full of interesting reading matter, a portrait of district commercial superintendent I. N. Miller adoring its pages.

Ruling Against Charging for Date on Telegrams.—The Public Service Commission, Second District, New York, has decided that a charge made by the Western Union Telegraph Company to the Postal Telegraph-Cable Company for the words constituting the originating address and date upon a telegram transferred by the latter to the former company is unjust, unreasonable and unduly discriminatory, and the Western Union is required to desist from the practice.

Electric Club of New England.—At a meeting of the Electric Club of New England held in Boston November 10, it was voted to affiliate with the New England Telephone and Telegraph Society as an independent unit, to be called the Western Union Chapter. A committee was appointed to carry the arrangement into effect. Mr. C. F. Ames, district commercial superintendent, Boston, and Mr. O. A. Conner, manager of the Boston district, Western Union Telegraph Company, addressed the meeting.

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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.

Baseball and the Telegraph.—During the three days on which the world championship baseball games were played in New York 700,000 words of press matter were transmitted by the Western Union Telegraph Company, and the total for the six games at New York and Philadelphia was 1,250,000 words. These figures far exceed the press matter that is sent from presidential conventions.

Jubilee of Opening of First Overland Telegraph Line.—On October 25, 1861, fifty years ago, the Overland California Telegraph lines were completed, and the mayor of San Francisco sent a congratulatory telegram to the mayor of New York.

Our Instruction Course in Technical Telegraphy.

We are receiving many letters of commendation regarding the instruction course in technical telegraphy now appearing serially in our columns, and all, without exception, express the belief that much benefit will result from a study thereof, not only to the individual student but to the employing companies.

Students, however, should bear in mind that there is no royal road to learning; it requires diligent study and close application to the work to acquire knowledge, and one or two readings will not bring the results. Every sentence of the lessons should be gone over and over again in order to gain a thorough understanding of the subject; knowledge cannot be gained any other way. Yet nothing is easier when the student goes to work with determination to win, and as he progresses he will find much pleasure in overcoming what seem to be obstacles.

The telegraph officials, without exception, are hearty endorsers of the course. Mr. George D. Perry, general manager of the Great North Western Telegraph Company of Canada, Toronto, Ont., states that his company has taken the matter up, as it has many other articles of special interest which appear from time to time in our columns.

The English, German, Japanese and other foreign governments also give particular attention to the special articles which appear in TELEGRAPH AND TELEPHONE AGE, and they regard the paper as having a particularly high educational value.

Every telegrapher should avail himself of this splendid opportunity to learn the technical side of his business and thus fit himself for better positions.

INDUSTRIAL NEWS.

Electric Storage Battery Convention.—The Electric Storage Battery Company, Philadelphia, Pa., held the sixth convention of its staff and sales department at the Bellevue-Stratford, Philadelphia, on November 6, 7, 8, 9 and 10. The convention was attended by the managers and salesmen from its various sales offices in Philadelphia, New York, Chicago, Boston, Cleveland, St. Louis, Denver, Detroit, Atlanta and San Francisco. At the conclusion of the convention a company banquet was held at the Radnor Hunt Club.

A Seasonable Booklet.—The Okonite Company, 253 Broadway, New York, has published an attractive booklet entitled "Economy in Joint Making, With Instructions." It contains information which should be very much in demand at this season of the year as now is the time to make repairs in the way of insulating and protecting joints so that short circuits, with their accompanying troubles, may be avoided during the winter to come. Copies of the booklet can be secured on application to The Okonite Company.

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The Pittsburgh, Shawmut & Northern To Use Telephones.—The Pittsburgh, Shawmut and Northern Railroad Company has placed an order with the Western Electric Company for equipment to be used in connection with the introduction of train dispatching by telephone on a part of its system. A switchboard is also to be furnished, thus giving the railroad its own telephone system. There will be six selector stations on the dispatching circuit, which is to be approximately fifty miles in length and will extend from St. Mary's, Pa., to Brookville, Pa. The telephone stations will, for the present, be ten in number.

New York Telegraphers' Aid Society. — The annual entertainment of the New York Telegraphers' Aid Society for the benefit of the Relief Fund will take place on Tuesday evening, November 21, at the Lexington Ave. Opera House, Fifty-eighth Street near Third Ave., New York. Mr. James P. Clolery is chairman and announces that the members of the various committees are making every effort to bring this year's event up to the standard and if possible surpass previous entertainments. An interesting programme of entertainment is being prepared and a very enjoyable time is assured.

LETTERS FROM OUR AGENTS.

PHILADELPHIA POSTAL.

President Clarence H. Mackay recently visited the Philadelphia main office and spent several hours meeting the different members of the force. He seemed much pleased with the appearance of the office and had a good word for the "men behind the guns," as he expressed it.

Night wire chief J. E. Zecher and city foreman E. W. Batchelor, are again on duty after having been on the sick list for several weeks.

Mr. Charles S. Almes has been appointed repeater chief.

Mr. F. N. Wagner has been acting manager of the *Evening Bulletin* staff in the absence of T. R. Poppert.

Miss Alice D. Deasy has resigned to remove to Colorado.

Mr. Dennis A. Coyle was recently presented with twins, a boy and a girl.

Miss May Whalen has been appointed night telephone clerk.

Chief operator E. W. Miller and Messrs. Madden, Lane, Price and McCusker, of the Philadelphia office, and Conly, of the Trenton office, handled the press file of the Harvard-Princeton and the Dartmouth-Princeton football games at Princeton, N. J., on November 4 and November 11.

The great telegraphic song hit,
"SEND ME A NIGHT LETTER, DEARIE."
Good, catchy music; beautiful title design magnificently printed in colors. Title contains night letter. Sung all over New York, 17c. by mail. All popular music sent by mail.
B. L. BRANNAN,
195 B'way, N. Y.

Messrs. Denniston and Auerbach, of the Philadelphia office, very creditably handled the big file of press matter at Burlington, N. J., on the occasion of a Democratic rally at that place on November 4.

Additional sets of low-resistance quadruplexes are being installed here to meet the increasing demand for better facilities.

The Telegraphers' Mutual Benefit Association, 195 Broadway, New York, combines fraternalism with sound business principles; it offers to the telegraph and telephone employe an absolutely safe form of protection, at a cost within the reach of all and lower than can be found elsewhere. Membership is open to employes in commercial or railroad telegraph or telephone service, and it is manifestly to the interest of those who are eligible and wish to secure life insurance within their means, to secure without delay a certificate for $1,000 or $500, or both, at rates based on present age.

Rare Books For Sale. — Transactions of the American Institute of Electrical Engineers, Vols. 1 to 27, 1884 to 1908, monthly numbers, unbound, in excellent condition. $100. Geo. C. Maynard, U. S. National Museum, Washington, D. C.

OFFICE MANAGEMENT
Report writing—handling of telegraph office accounts—relation of the operator to the public—penmanship—Lectures and practical work.
A new course designed to prepare telegraph operators for advancement—a thorough course by leading experts.
Booklet "H" to any address.
EAST SIDE Y. M. C. A. TELEGRAPH SCHOOL
New York City

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.

Martin's double or single lever **VIBROPLEX** $7.50. D. C. DeLany, 15 S. Broad St., Atlanta, Ga.

TRANSMITTING MACHINES
I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to
James Uncles, NORTH ADAMS Massachusetts

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.

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Telegraph and Telephone Age

No. 23. NEW YORK, DECEMBER 1, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Fuses and Lightning Arresters.

No doubt the majority of persons who have occasion to renew or replace fuses and arresters, possess a fair knowledge of the construction, capacity and general use of these devices, but there are always others who simply consider a fuse a fuse, and an arrester an arrester, to be used indiscriminately wherever one or the other is required. Happily we may disregard the latter class, as any one possessing so limited a knowledge does not usually hold a position of much importance. Yet there are certain facts in connection with fuses and apparatus that even some fairly informed attendants have never had their attention called to, and which should be of great value to one located at a point somewhat distant from the supply department, or where he may be called upon in an emergency to personally make repairs.

For example, let us take an arrester of the cartridge type, which in addition to the fuse alloy within the cartridge, has, as a lightning arrester proper, two small carbon blocks insulated from one another by a thin sheet of mica. Let us now suppose that the mica strip has become damaged by a heavy stroke of lightning and the attendant not possessing another attempts to repair it. It seems like a very simple operation—merely that of obtaining another strip of mica, cutting it to the right length and width, and placing it between the two carbons—but that is not all that is required. You should know exactly how thick the sheet should be, otherwise you do not know whether you have a protector or not. This is a detail one learns only from the specification papers regulating its construction, or by information obtained by the commendable habit of asking questions. For instance, the mica sheet, as also in case of fuse alloy, to be of any practical value must have a known breakdown capacity. For mica the capacity is given in volts; for fuses in amperes.

Referring to the subject of repairs, suppose the damaged sheet of mica was .011 of an inch in thickness. We know from data obtained by many tests that it has a "break-down" capacity of approximately 750 volts. Now suppose the attendant, not appreciating the importance of this, had placed a store-purchased sheet of double that thickness between the carbons. What would be the result of his well meant efforts? Simply this: He would have endangered perhaps very delicate and costly apparatus because the mica would not break down, and thus protect, when a potential of 750 volts occurred. He might just as well have had no arrester at all in the circuit, for the reason that its breakdown capacity is entirely too great for the purpose for which it was intended, so it is best to always get an exact duplicate, as to dimensions and consistency, of any part you wish to replace or repair.

It might be asked, "What is the necessity for both fuse and carbon-mica in the arrester?" "Wouldn't the fuse melt also?"

No, or at least not always, for the reason that a certain length of time is required for heat to develop, as well as for the constituents of the alloy to separate and break the wire.

On the other hand, a high e. m. f., such as that of a stroke of lightning, pierces the mica instantaneously, and thus diverts the greater portion of the current into the ground before it reaches the fuse alloy.

The "breakdown" capacity of mica in sheet form of different thicknesses should make not only an interesting, but a valuable subject for study, as mica is now fast superseding hard rubber for insulating purposes wherever possible. All new standard telegraph apparatus, such as keys, transmitters, repeating sounders, etc., have mica insulation. It will not melt and cannot be destroyed by such powerful currents that prove fatal to the life of hard rubber.

In like manner there are a few things concerning fuses that are often overlooked by unobserving persons if not actually unknown.

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Take, for example, the 3/10 and 8/10-ampere standard coil type fuses used in the porcelain block receptacles. They both look practically alike as to size, construction and general appearance when not inspected closely. Hence if an 8.10 fuse should be mistaken for a 3/10 fuse and used as a substitute therefor, it would be no protection at all, as the danger mark could be reached and passed long before a blow-out would occur. The similarity in the appearances of the two fuses is due to the fact that the coil surrounding the alloy or core of each type consists of practically the same size insulated wire.

No doubt there are also those who are under the impression that the coil wire itself constitutes the fuse proper. Such, however, is not the case. The short length of lead wire with which the coil wire is connected in series is the active part of the fuse, and by its dimensions, or diameter, one should readily be able to distinguish a 3/10 from an 8/10 fuse, even though no other information were available.

Again a 3/10 fuse possesses about four ohms resistance which must be taken into consideration. For instance, if placed in series with a four-ohm sounder circuit fed by a two-volt storage battery, the total resistance would be eight ohms and the volume of current would be just right, viz.: 250 milliamperes. But, should you substitute an 8/10-fuse, which has practically a negligible resistance, the sounder would receive 500 milliamperes, which is entirely too much.

Even in the case of straight bare fuse wire, one cannot be too particular in choosing a substitute link when a blowout occurs. The same diameter of fuse-wire by different manufacturers may vary considerably in capacity and resistance per given length.

The lesson to be learned is that substitutes of all kinds should be identical in every respect with the material discarded.

Repeater Cords.

Referring to the article of Mr. Willis H. Jones, on page 663 of our October 16 issue, and page 695 of the November 1 issue, on the subject of loop, cord, wedge and jack troubles, Mr. H. C. Pierce, wire chief of the Omaha, Neb., Western Union office, writes:

"In this article is the statement that neither the old nor the new repeater cords will answer the purpose of cutting together the old and new type of multiplex sets.

"I would like to say that we have in service both old and new style in the office here and cut them together with the old style cord by leaving the battery on the new set the same as if we were to work it on a jumper. Cut it through to the old set with the old cord in the ordinary way and throw the three-point battery switch of the old set to the grounded side as is done with one set when two of the old style sets are cut together. This saves any changes in wiring of any kind."

Recent Telegraph and Telephone Patents.

ISSUED NOVEMBER 7.

1,007,684. Telephone Ringing Device. To H. N. Faris, Kansas City, Kan.

1,007,883. Telephone Transmitter. To C. T. Mason, Sumter, S. C.

1,008,122. Telephone Casing. To W. W. Dean, Elyria, Ohio.

1,008,216. Party-Line Telephone system. To E. Stout and J. S. Kupka, Martinsburg, Iowa.

1,008,232. Telephone Trunking System. To C. S. Winston, Chicago, Ill.

1,008,282. Selective Telephone Signaling System. To C. H. North, Cleveland, Ohio.

ISSUED NOVEMBER 14.

1,008,313. Fire Alarm System for Telephone Exchanges. To W. L. Denio, Rochester, N. Y.

1,008,408. Telephone Ringing Device. To H. N. Faris, Kansas City, Kan.

1,008,452. Selective Signaling System. To V. Durbin, Brookline, Mass.

1,008,522. Mouthpiece for Telephones. To F. O. Beuermann, New York.

1,008,800. Telephone Repeating Circuits. To C. Adams-Randal, New York.

1,008,881. Telephone Repeating System. To C. Adams-Randal, New York.

Financial.

The directors of the Chicago Telephone Company at a special meeting on November 22 declared the usual quarterly dividend of two per cent.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange November 25.

Western Union Tel. Co.	78¼
Mackay Companies	83
" " pfd.	72½
Amer. Telep. and Teleg. Co.	141⅝

Personal.

Mr. Thomas D. Lockwood, general patent counsel of the American Telephone and Telegraph Company, Boston, Mass., is spending a few weeks at Old Point Comfort, Va.

Mr. W. H. Sawyer, a former official of the Phillips Electrical Works, Providence, R. I., a well-known old-time telegrapher, but now retired, has gone to Pasadena, Cal., to spend the winter.

Mr. A. L. Edgecomb, superintendent of telegraphs of the Northern Telegraph Company, Boston, Mass., is taking a long rest in the Maine woods in search of health. At last reports he was steadily improving. Mr. Edgecomb was formerly superintendent of the Postal Telegraph Cable Company at Boston.

Mr. C. E. Davies, manager of the Great North Western Telegraph Company's office at Ottawa, Ont., has been appointed supervisor of equipment

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of the larger offices of the company in addition to his regular duties as manager. His headquarters will remain at Ottawa.

Mr. W. B. Scott, vice-president and general manager of the Union Pacific Railway, with office at Omaha, Neb., began his business career as a messenger on the Grand Trunk Railway at Guelph, Ont., afterwards becoming an operator at Toronto for the same road. Later he became superintendent of telegraph on the Chicago Great Western. He has filled many important railroad positions.

Mr. Donald Murray, of London, Eng., the inventor of the Murray printing telegraph systems, is in New York exhibiting his apparatus. Ten years ago Mr. Murray was identified with the Postal Telegraph-Cable Company in this city since then he has been developing and installing his systems in England, Germany, Russia and other countries. Mr. Murray expects to be in New York several weeks.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. C. H. Mackay, president, is in the South on a combined business and pleasure trip.

Mr. E. J. Nally, vice-president and general manager, has returned from his extended trip of inspection to the Pacific coast.

Mr. T. N. Powers, chief operator of the Chicago office, spent several days recently in New York on business connected with the service.

Mr. Adolf Franke, director of the Siemen's and Halske A. G., Berlin, Germany, who is in this country on a visit of inspection of electrical plants and industries, visited the operating room and other engineering departments of this company on November 20.

Mr. H. H. Hall, manager of the Postal Telegraph-Cable Company, Ashtabula, Ohio, and a prominent citizen of that place, celebrated his seventy-fifth birthday on November 3. He entertained five other gentlemen whose ages ranged from 75 to 85 years.

Mr. H. L. Carpenter, manager at Asbury Park, N. J., is spending Thanksgiving with his mother at Schenectady, N. Y.

Miss E. G. Trice, manager at Seaford, Del., spent November 23 in New York visiting branch offices and sight-seeing.

John J. Kennedy, aged 54 years, marine operator for this company at New York, died on November 19. Deceased was identified with the telegraph department of the Maritime Exchange for over 20 years, prior to his employment by this company. He was an authority on marine matters.

Mr. George R. Andrews, former manager of this company's office at Fresno, Cal., is now public administrator at that place.

Among the recent executive office visitors were: N. C. Pangburn, foreman of construction, and W. M. Pruyn, manager, Albany, N. Y.; C. A. Richardson, superintendent, and J. D. McDonald, chief operator, Boston, Mass.; H. D. Reynolds, district superintendent, and L. J. Reynolds, assistant manager, Buffalo, N. Y.; C. E. Diehl, manager, Harrisburg, Pa.; R. P. Martin, manager, Hartford, Conn.; C. H. Hellmuth, manager, Hoboken, N. J.; R. A. Barton, manager, Lancaster, Pa.; N. C. Hall, manager, New Haven, Conn.; J. F. Coogan, manager, Newark, N. J.; C. E. Bagley, superintendent, A. E. Zintl, assistant manager, and E. W. Miller, chief operator, Philadelphia, Pa.; H. Scrivens, superintendent, and T. Peckes, district foreman, Pittsburgh, Pa.; G. S. Richtmyer, manager, Passaic, N. J.; G. H. Mills, manager, Providence, R. I.; S. G. Fitch, manager, Scranton, Pa.; S. W. Smith, manager, Saratoga, N. Y.; G. M. Foote, manager, Washington, D. C.

This company has completed the laying of a large cable across the Mississippi river between Baton Rouge and Anchorage, La. It is 4,000 feet long and heavily armored and will form part of the New Orleans-Houston line.

This company issued an attractive slip for distribution prior to Thanksgiving. It showed the company's sign-message addressed to "Everybody, Everywhere," with an invitation to use the Postal lines in sending Thanksgiving greetings. The border of the slip was printed in colors and a colored picture showed a typical Thanksgiving scene.

The Mackay Telegraph and Cable Company opened its Beaumont, Tex., office on November 16. Mr. W. H. Pippitt is the manager.

The office of the Mackay Telegraph and Cable Company in San Antonio, Tex., is being fitted up in anticipation of the completion of the building of the lines to that point. It is expected that they will reach that city about December 1. Mr. A. G. McGalin is the electrical engineer in charge of the work.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Messrs. G. M. Yorke, engineer; E. Y. Gallaher, auditor; Robt. E. Chetwood, engineer of construction and W. N. Fashbaugh, traffic engineer, have returned from a trip to Chicago on company business. Mr. Belvidere Brooks, general manager, who accompanied the party from New York, stopped over for a few days' rest at French Lick, Ind.

Mr. T. W. Carroll, assistant to the general manager, has returned from his trip through the South.

Mr. R. W. Whitehead, division plant superintendent, and Mr. E. Lamont, equipment supervisor, Chicago, Ill., recently spent a few days in New York on company business

Mr. J. Cahill has been appointed general traffic chief at the New York Cotton Exchange. Mr. Cahill was formerly manager.

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Mr. J. Veitch has been transferred from 16 Broad Street to the Cotton Exchange district as district commercial manager.

The following appointments of managers have been made in New York City: Mr. M. Posner at 32 Desbrosses Street, vice J. A. Reynolds transferred to the general operating department. Mr. J. J. Gilroy at 693 Columbus Avenue, vice N. Feder transferred to the general operating department and W. A. Sanford at 426 Columbus Avenue vice J. J. Gilroy.

A special meeting of the Commercial Managers Association of New York was held November 17 for the purpose of making arrangements for the fall dinner, which will be held in the first week in December. All of the commercial managers of New York City were present. Mr. A. W. McMahon, district commercial manager, read a paper on "Salesmanship."

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. The rear end of the building, with a frontage of seventy-five feet on Dey Street, below the present structure will be erected first and ultimately the building will be extended to take in the corner at Broadway and Dey Street. It is stated that the first work will be started May 1, 1912.

Mr. J. W. Ware, of the Birmingham, Ala., Western Union office, has been appointed chief clerk to division commercial superintendent J. M. Stephens, at Atlanta, Ga.

Mr. H. C. Baker, night chief operator of the Knoxville, Tenn., office has been promoted to be chief operator vice A. J. Storey, resigned.

Mr. George R. Shultz, manager of the Western Union Telegraph office and cables landing at Punta Rassa, Fla., was a recent New York visitor. He is on a leave of absence of several weeks, and will visit Chicago, Atlanta, Ga., and other places before he returns home. Mr. Shultz went to Punta Rassa in 1866 and is a prominent citizen of that place. He is proprietor of a fine large and popular hotel on the beach at that point.

Mr. Richard Terhune manager for the Western Union Telegraph Company at Ossining, N. Y., has been retired from further active duties after a service of fifty-two years. He is now seventy-two years old, and established the office in Ossining in 1864.

Several improvements have been made in the Cleveland, Ohio, main office, to facilitate the handling of the growing business and provide greater comfort for the employes. The old lighting arrangement has been replaced by more modern equipment and commodious quarters have been provided for the clerical force.

The office of this company at Tacoma, Wash., has been remodeled and is now modern in every way. New equipment has been installed in the operating and telephone rooms, and the messengers have comfortable and commodious quarters. Mr. R. R. Sprinkle is manager of the office.

Mr. Vail in California.

Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and the Western Union Telegraph Company, was in Los Angeles, Cal., recently. In an interview Mr. Vail gave his views with reference to the telephone situation in that city. Among other things he stated that the American Telephone and Telegraph Company is conducting elaborate experiments in wireless telephony. He stated that the telephone line between Los Angeles and New York would probably be ready by November 1, 1912. It will cost $500,000 for line alone, and the cost per conversation will probably be between $14 and $15.

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. A business meeting was held in the afternoon and in the evening a banquet which was presided over by Mr. O. A. Conner, manager of the Boston office. The attendance was about 100.

Mr. E. M. Mulford, division commercial superintendent, New York, told of what the company had done during the past year in the matter of increasing business and giving better service. Mr. A. C. Kaufman, commercial agent, New York, discussed the question of soliciting business, while other speakers included Messrs. C. F. Ames, district commercial superintendent, L. D. Wilbourn, district traffic superintendent, and W. S. Barker, district plant superintendent, Boston.

Western Union Conference in the South.

A conference of division officials and district managers was held in Atlanta, Ga., November 21, 22 and 23 at the call of Mr. H. C. Worthen, general superintendent, Atlanta, Ga. In the evening of November 21 Mr. Worthen entertained the visiting superintendents at a dinner and reception at his home, and on the following evening Mr. J. M. Stephens, district commercial and traffic superintendent, likewise entertained the managers. On the evening of November 23 the entire party met at a banquet at the Capital City Club. Following are the names of those who were present:

Messrs. H. C. Worthen, general superintendent; J. M. Stephens, division commercial superintendent; L. H. Beck, division plant superintendent; B. P. Hancock, traffic superintendent; J. P. Edwards, special agent to the general superintendent; J. Levin and J. E. Scofield, special agents to the division commercial superintendent; E. E. Williams, district superintendent; G. W. Lloyd, commercial superintendent; W. A. Neill, district plant superintendent, all of Atlanta. J. S. Calvert, district superintendent; F. O. Nourse, commercial superintendent, and J. B. Faulkner, district plant superintendent, Richmond, Va.; J. R. Terhune, district superintendent, H. J. Carpenter, commercial superintendent, and

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W. K. McClarin, district plant superintendent, Nashville, Tenn.; L. J. Maxwell, district superintendent, S. L. Burts, commercial superintendent, and J. C. Duane, district plant superintendent, Jacksonville, Fla.

A dinner was given by Mr. E. E. Williams, district superintendent, Atlanta, Ga., at the Capital City Club, in that city, November 15, to the following managers: C. R. Hughes, Athens, Ga.; C. K. Henderson, Albany, Ga.; L. R. Daniels, Augusta, Ga.; W. W. Murphy, Savannah, Ga.; R. K. Munn, Columbus, Ga.; Frank Woodruff, Rome, Ga.; W. P. Rivers, Brunswick, Ga.; F. B. Washington, Macon, Ga., and W. J. Francis, Atlanta, Ga.

Addresses were made by Mr. H. C. Worthen, general superintendent, and division commercial superintendent J. M. Stephens. Talks were also made by J. P. Edwards and B. P. Hancock, traffic inspectors. After luncheon the managers repaired to Superintendent Williams' office, where instructive talks were given by special agents J. Levin and J. E. Schofield, after which superintendent Williams closed the meeting with an enthusiastic speech.

A conference of the managers of the larger Western Union offices in Alabama was held in Birmingham November 17, and a dinner was tendered to them by district superintendent E. E. Williams. The following managers were present: S. G. Bentley, Mobile; C. E. Davidson, Montgomery; H. Barrett, Gadsden; R. L. Smith, Selma; G. A. Maxwell, Anniston, and G. R. Calvert, Birmingham.

The Cable.

Mr. A. Focque, director of the French Cable Company, at Paris, France, has been made a chevalier of the French Legion of Honor.

Deferred Cable Service with Australia. — The Postmaster General of Australia states that it is likely that the system of "deferred rate" cablegrams will be introduced on January 1, 1911. The special "deferred rate" will not apply to cablegrams which are written in cipher, but to the plain language messages rated at 1s. 6d. (36 cents) a word.

Municipal Electricians.

Police-Call System.—One of the largest light-signaling police-call systems in the country has been installed in Peoria, Ill., by the Gamewell Fire Alarm Telegraph Company, New York.

Telephones for Milwaukee Police and Fire Alarm. — Three hundred telephones are to be purchased for the use of the consolidated police and fire alarm system in Milwaukee, Wis.

A high telephone official states that TELEGRAPH AND TELEPHONE AGE is by far the most valuable paper for information and general telegraph and telephone news that reaches telephone people.

The Telephone.

Mr. H. J. Pettengill, president Southwestern Telegraph and Telephone Company, Dallas, Tex., was a recent New York visitor. He represented the Texas business men's association at the recent meeting of railroad men at the Waldorf-Astoria Hotel.

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

Damage to Telephone Cable by Squirrels. — Telephone men in Ann Arbor, Mich., complain of the damage done to telephone cables by squirrels. Recently a 200-line cable was so damaged and the injured section had to be cut out and replaced with a new portion.

The Washington-Boston Underground Telephone Line.—The Chesapeake and Potomac Telephone Company recently put into service a new and modern long-distance board in Baltimore, Md. This board will be used in connection with the Washington-Boston underground service.

Automatic Telephone Exchanges.—An automatic telephone system is nearing completion in Dallas, Tex. It comprises a main and four branch exchanges. The wire plant includes 800,000 feet of wire, almost entirely in lead-covered cable. The initial capital outlay is $1,500,000. It is stated that over 11,000 service contracts have already been signed, and it is expected that the construction work will be completed by the first of the year. At Houston, Tex., there is also being installed an automatic telephone exchange which will be ready for regular operation early in 1912.

Telephone Pioneers.

Mr. T. B. Doolittle, of Branford, Conn., and Mr. C. R. Truex of New York, have been appointed members of the executive committee of the Telephone Pioneers of America, by president Theo. N. Vail.

Secretary Henry W. Pope of the Telephone Pioneers of America has appointed Mr. P. Kerr-Higgins of Oklahoma City, Okla., and Mr. E. E. Bawsell of Atlanta, Ga., corresponding secretaries of the Telephone Pioneers of America in their respective jurisdictions. Corresponding secretaries are charged with enrolling members and advising the secretary of the deaths of members and give other information likely to be of interest. Mr. Higgins is assistant to the president of the Pioneer Telephone and Telegraph Company at Oklahoma City, and Mr. Bawsell is associated with the Southern Bell Telephone and Telegraph Company at Atlanta, Ga.

Telegraphs in Manchuria.—At the end of 1910 there were fifty-six telegraph offices in Manchuria under Chinese administration. The total length of telegraph lines was 12,290 Chinese li (1 li equals 2,115 feet).

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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.]

(76) Q. How many telegraph cables are there now in operation between Europe and America? N. I.

A. There are seventeen. Considerable information regarding Atlantic cables was given in the reply to question No. 30 in our issue for April 1, last.

(77) Q. Are porcelain insulators used to any extent in this country for telegraph lines? T. D.

A. Very little indeed, if at all. Glass is the standard insulator material in this country. The Canadian Pacific Railway, however, is using porcelain insulators very largely. Valuable articles on insulators may be found in our issues for January 16, March 16 and July 16.

(78) Q. Can you recommend some book that contains explicit directions for wire testing, according to modern practice? N. S. T.

A. Wire testing is a very important part of the work in most telegraph offices, and every operator should be familiar with the practice. Mr. Willis H. Jones' "Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students" contains a chapter on wire testing, and in the February 16 issue of TELEGRAPH AND TELEPHONE AGE was printed an article by the same author on "Wire Patching and Testing," which will be found very helpful. Copies of this issue and of Mr. Jones' book can be obtained at the office of this journal at 10 cents and $1.50 each, respectively.

(79) Q. I have been told that when an electric current passes through a wire the useful effects are outside of the wire—in the air—rather that in the wire itself. If this is true will you please explain why, and oblige? W. T.

A. This question opens up a very interesting field for discussion and would require more space to go into it fully than we can give it in this column. What you have been told, however, is true. The most important effects of an electric current are outside of the wire. The so-called magnetic field is entirely outside and without it no electromechanical action would be possible. The wire simply directs the current of electricity along a certain path.

(80) Q. What is the concrete definition of the standard unit of resistance? D. E. C.

A. The standard unit of resistance, the ohm, is that of a column of mercury one square millimeter (.0016 sq. in.) in cross sectional area and 106 centimeters (42.4 inches) high, at a temperature of 32° Fahr.

E. H. Binford, Superintendent, Mountain Telegraph Company.

Mr. Emil Harley Binford, whose appointment as superintendent of the Mountain Telegraph Company, Denver, Col., was announced in our issue for November 1, is a native of Iowa, having been born at Cambria, in that state, on June 14, 1871. In 1892 he began his telegraphic career as operator for the Keokuk and Western Railroad at Humeston, Iowa, and was later connected with the Union Pacific Railroad. In 1898 he went with the Victor American Fuel Company as chief in the auditing department, which position he held at the time of his recent appointment as superintendent of the Mountain Telegraph Company.

Bankruptcy Against C. C. Wilson.—An involuntary petition in bankruptcy has been filed in the United States District Court, New York, against Christopher C. Wilson, former president of the United Wireless Telegraph Company, who is now serving a two-year term in the Federal prison at Atlanta, Ga., for fraudulent use of the mails. The claims total $1,685,710. The petitioning creditors are trustees in bankruptcy of the United Wireless Telegraph Company and the National Surety Company of New York, and Herman G. Neuhoff.

The "Seventh District Blue Book."—The December number of the "Seventh District Blue Book," issued by the staff of the Cincinnati, Ohio, office of the Western Union Telegraph Company, is an interesting and unique production, and is worth more than a passing notice. The pages of reading matter are reproduced on a typewriter duplicator, and the cover is a blue print made from a design on tracing cloth. All the mechanical work is done by stenographers, clerks and office boy in the district commercial superintendent's office. The reading matter is of excellent variety and quality and reflects great credit upon those who are concerned in the production of this unique pamphlet.

Two-Volt Dry Cell.—A new two-volt dry cell is being placed upon the market, each cell having, it is claimed, an energy output equal to eight of the average dry cells.

New Electrical Invention by Prof. Pupin.—At the meeting of the National Academy of Sciences held in New York, November 22, Professor M. I. Pupin, of Columbia University, described an electrical apparatus which he purposes demonstrating at the Spring meeting of the Academy, by which telegraph and telephone currents can be greatly augmented.

Descriptions of inventions and latest and approved apparatus, the latest news in the telegraph and telephone fields and educational articles are the chief features of TELEGRAPH AND TELEPHONE AGE.

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Fall Dinner of the Magnetic Club.

The Magnetic Club held its fall dinner at the St. Denis Hotel, New York, in the evening of November 15 and it was largely attended. 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 Telegrapher's Mutual Benefit Association, which was held in the afternoon of the same day.

An excellent dinner was served and much enthusiasm prevailed. During the dinner, vocal and instrumental music was given with fine effect, the singing of the Postal Glee Club being particularly well rendered.

At the conclusion of the dinner president C. P. Bruch read letters from Hon. W. S. Jordan, of Jacksonville, Fla., president of the Old Time Telegraphers' and Historical Association, Col. W. B. Wilson, of Holmesburg, Philadelphia, Col. A. B. Chandler, and others in which they expressed their regrets at not being able to attend the meeting.

After welcoming the members of the United States Military Telegraph Corps, president Bruch called upon Mr. David Homer Bates, secretary of the society, for a few remarks.

Mr. Bates referred to Mr. Andrew Carnegie's pensions to needy members of the military telegraph corps; to Mr. W. J. Dealy as being the first prisoner of the war, and to the monument to Secretary E. M. Stanton, which was recently unveiled at Steubenville, Ohio.

President Bruch then, after paying a tribute to the old time telegraphers and extending the hospitality of the club to them, introduced Mr. W. J. Dealy who spoke of his acquaintance with Professor Morse and James D. Reid. He referred to Mr. Walter P. Phillips—who was present—as a man who knew the telegraph business from A to Z.

Mr. Phillips was the next speaker. He related an ancedote of Mr. P. B. Delany and Mr. Thos. A. Edison.

Mr. S. S. Garwood, of Philadelphia, thanked the club for its hospitality of many years in inviting the delegates of the Telegraphers'Mutual Benefit Association to its dinners. In closing he proposed three cheers for president Bruch, which were given with hearty good will.

Major Samuel Reber, chief signal officer of the eastern division, United States Army, made a few remarks, and was afterward elected a member of the club by acclamation on the motion of president Bruch. Major Reber expressed his appreciation of the honor.

Remarks were also made by Mr. C. A. Tinker and Mr. W. L. Ives.

President Bruch, in closing the oratorical part of the programme, referred feelingly to the late James D. Reid, the first superintendent of telegraph and an organizer and first president of the Telegraphers' Mutual Benefit Association, whose remains now lie in the cemetery in Rochester, N. Y., marked by a very simple headstone. He suggested that the telegraph associations including the Magnetic Club, and the telegraph fraternity at large, co-operate in a movement to raise funds for the erection of a suitable monument to mark the grave, and a motiion was carried to take the matter up.

The meeting closed with a vaudeville entertainment .

Following are the names of those present:

Albany, N. Y.—N. C. Pangburn and W. M. Pruyn.

Atlantic City, N. J.—G. Scott, M.D.

Boston, Mass.—P. J. Farrell, J. D. McDonald, C. A. Richardson.

Bridgeport, Conn.—W. P. Phillips.

Bradford, Pa.—J. E. Golden.

Buffalo, N. Y.—H. D. Reynolds and L. J. Reynolds.

Carbondale, Pa.—A. P. Troutwein.

Chicago, Ill.—F. D. Bermke and H. L. Krum.

Harrisburg, Pa.—C. E. Diehl.

Hartford, Conn.—R. P. Martin.

Hoboken, N. J.—C. H. Hellmuth.

Lancaster, Pa.—R. A. Barton.

New Haven, Conn.—N. C. Hall and J. W. Ladd.

Newburgh, Pa.—A. T. Post.

Newark, N. J.—J. F. Coogan.

New York—C. C. Adams, C. M. Adamson, H. T. Barkman, D. Homer Bates, D. H. Bates, Jr., J. R. Beard, M. W. Blackmar, W. P. Bowman, C. P. Bruch, E. B. Bruch, W. I. Capen, J. J. Cardona, C. N. Chatman, J. F. Cleverdon, M. R. Cockey, E. A. Coney, Theo. L. Cuyler, Jr., T. J. Cusack, F. W. Daly, W. J. Dealy, F. N. Dealy, H. W. Dealy, T. J. Donovan, J. Doran, W. B. Dunn, A. J. Eaves, A. P. Eckert, J. W. English, W. Finley, E. T. Flanagan, T. E. Fleming, J. H. Flood, D. H. Gage, F. B. Gerrard, R. Gould, W. S. Hallett, L. R. Hallock, H. W. Hazelton, T. E. Heffren, J. Hennessy, P. A. Hickey, L. L. Howell, T. J. Howlett, W. E. Huntington, W. L. Ives, M. H. Kerner, E. Kimmey, C. A. Lane, L. Lemon, C. F. Leonard, L. MacConnach, R. L. McCann, J. McCauley, J. J. McCormack, H. McNamee, J. F. McNeill, D. McNichol, F. McKiernan, D. J. McQuade, D. Mallen, H. T. Marks, Wm. Marshall, R. H. Miller, T. Mahoney, J. Moran, F. F. Norton, M. J. O'Leary, J. F. Patterson, F. G. Payne, C. F. Pearce, F. Pearce, T. Peckes, W. F. Pelton, E. B. Pillsbury, E. J. Rankin, M. W. Rayens, Major Samuel Reber, U. S. A., D. Regan, H. J. Reinhardt, E. Reynolds, D. P. Ritschy, C. Ruffer, W. A. Sawyer, W. Scarburgh, F. A. Scheffler, J. Shandley, C. Shirley, T. Singleton, J. B. Taltavall, T. R. Taltavall, A. L. Tinker, C. A. Tinker, E. P. Tully, J. Tynan, E. M. Underhill, R. Underhill, W. J. Walsh, R. J. Weeks, H. Weise, J. J. Whalen, A. G. Williams, H. Zweifel.

Philadelphia, Pa.—C. E. Bagley, S. S. Garwood, E. W. Miller, A. E. Zintl.

Pittsburg, Pa.—H. Scrivens.

Passaic, N. J.—G. S. Richtmyer.

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Providence, R. I.—G. H. Mills.
Scranton, Pa.—S. G. Fitch.
Saratoga, N. Y.—S. W. Smith.
Wilmington, N. C.—W. P. Cline.
Washington, D. C.—J. W. Collins, G. M. Foote.

The Development of the Telephone in Pittsburgh.

Mr. F. H. Bethell, vice-president of the Central District and Printing Telegraph Company, New York, on October 27 made an address before the Pittsburgh Telephone Society, Pittsburgh, Pa. The address related principally to the industrial growth of Pittsburgh, with the development of the telephone interwoven.

Among other things Mr. Bethell said: "In passing to the development of the wire service, I am at the outset going to refer to a Pennsylvania man, and a telephone man, whose interest in the development of the telephone and the telegraph is as strong today as it was sixty years ago, when he was in the military telegraph service—Mr. Richard O'Brien, a director in the Bell Telephone Company of Pennsylvania, and for many years a director in the old Pennsylvania Telephone Company.

"In May, 1861, Mr. O'Brien, then a boy, was the military telegrapher stationed at the arsenal at Washington, D. C. One day in June, of that year, President Lincoln visited the arsenal and, going to the telegraph instrument to write a message, he watched Richard send it and take another. I am quoting now from 'Telegraph in Battle:'

> "Richard reading, of course, by sound and writing in beautiful penmanship, Mr. Lincoln remarked, 'Young man, you do that well; where do you hail from?' 'From the Pennsylvania Railroad, Mr. President,' said Richard. 'Are you one of the operators who came with Carnegie and Bates?' 'Yes, Mr. President.' 'Well, you are in a pretty safe place here, surrounded by all these big guns.' 'Yes, Mr. President: but I would much rather be at the front where I can hear them roar.' Mr. Lincoln seemed amused at this, and asked his name. Richard told him. He smiled and, turning to Major Ramsey, who was with him, said, 'He comes of a fighting race; treat him well or he will run away to the front.' It was not long until Richard was in the front and heard them roar."

"Mr. O'Brien's desire to be in the front and to 'hear them roar' is the desire of all good telephone and telegraph men."

New Book.

The Boy's Life of Edison, by W. H. Meadowcroft. This latest addition to the wonderful story of the life of Mr. Thomas A. Edison and his achievements is an intensely interesting one, and although it is written ostensibly for the benefit of the boy the man will be just as much interested in reading it. No one is better qualified to talk about Mr. Edison than is Mr. Meadowcroft, for the two have been intimately associated for many years, and the story as told by the author has been read carefully by Mr. Edison himself and is published with his consent.

There are twenty-five chapters to the book dealing with Mr. Edison's boyhood and the various phrases of his active career, arranged in chronological order. The chapters relating to his telegraphic experiences are deeply interesting, and the old story has been told in a new way, with a different light thrown upon it.

The story of Mr. Edison's life is always inspiring to young and old alike, and this latest volume appears at a time when it should meet with a large demand for the Christmas trade. It is published by Harper & Brothers, New York, and contains a recent picture of Mr. Edison as the frontispiece. It has 332 pages and is printed in clear large type. The price of the book is $1.25, and copies are for sale by TELEGRAPH AND TELEPHONE AGE, 253 Broadway, New York.

Submarine Telephone Cables Around New York.

It is doubtful whether the average telephone patron, in talking to a distant person, realizes the time and labor involved in providing the facilities for the purpose. As a rule he is inclined to take such conveniences as a matter of course.

An interesting article in the *New York Telephone Review* tells by the aid of several illustrations how a submarine telephone cable was laid under the North River from Manhattan to Jersey City, N. J.

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 propeller.

Those responsible for laying and maintaining these cables have learned by long experience how to meet and solve the problems connected with the work. By making use of the best methods little trouble is met as a general rule, and consequently there are few interruptions to the service.

Statue of Lord Kelvin.—A statue of the late Lord Kelvin is to be erected in Glasgow. Lord Kelvin was Sir William Thomson, whose inventions include the siphon recorder used on submarine cables, and many other telegraphic devices.

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Annual Meeting of the Telegraphers' Mutual Benefit Association.

The forty-fifth annual meeting of the Telegraphers' Mutual Benefit Association was held at 195 Broadway, New York, November 15, vice-president Charles P. Bruch occupying the chair in the absence of President Belvidere Brooks.

After the reading of the report of the committee on credentials, which consisted of Messrs. F. D. Bermke, of Chicago; J. W. Collins of Washington, D. C., and G. H. Mills, of Providence, R. I., the report of president Brooks was read.

He called attention to the heavy mortality during the year, rendering it necessary to expend the entire income from assessments and interest, as well as to borrow $1,997.41 from the reserve fund to provide the payment of 105 death claims, amounting to $104,500. This is by far the largest amount for benefits paid by the association in any year, making the total amount paid to the beneficiaries of deceased members from date of organization $1,671,207.

One hundred and sixty-eight applications for membership in the full grade and 72 in the half grade were received during the year, a number which was not sufficient to provide for any increase of membership in the full grade after lapses and deaths were deducted. He pointed out that the responsibility for growth and expansion rests upon each and every member. Among the deaths during the year were two of past officers of the Association, namely, David R. Downer, who was secretary from 1867 to 1869, and Clarence Cary, president from 1881 to 1883. In accordance with the resolution passed at the last meeting the following members were invited and consented to act as the advisory board to promote the extension of the membership: Messrs. B. E. Sunny, president Chicago Telephone Company, Chicago, Ill.; H. J. Pettengill, president South Western Telegraph & Telephone Company, Dallas, Tex.; J. N. Kellar, president New England Telephone and Telegraph Company, Boston, Mass.; W. T. Gentry, president Southern Bell Telephone and Telegraph Company, Atlanta, Ga.; A. L. Salt, Western Electric Company, New York; H. C. Worthen, general superintendent Western Union Telegraph Company, Atlanta, Ga.; G. H. Usher, general superintendent Postal Telegraph-Cable Company, Atlanta, Ga.; G. E. Paine, general superintendent Postal Telegraph-Cable Company, Chicago, Ill.; C. H. Gaunt, general superintendent Western Union Telegraph Company, San Francisco, Cal.; J. G. Blake, general superintendent Postal Telegraph-Cable Company, San Francisco, Cal.; J. C. Nelson, general superintendent Western Union Telegraph Company, Denver, Col.

The reports of the secretary, the treasurer and the auditing committee were then read.

The secretary's report showed that there were 4,514 full-grade members on September 30 and 798 half-grade members.

The ratio of deaths per thousand of full-grade members was 20.62 and of half-grade members 8 82. and the average age of deceased members was 60 years in the full-grade and 40 in the half grade.

The report of the treasurer shows total receipts of $124,417.91, including interest on reserve fund and deposits, amount received from secretary, received in payment of loans, and from reserve fund for investment.

The disbursements included $104,500.50 for death claims, $6,497.00 for general expenses and $9,200 new loans and investments. The sum of $13,580.82 is held uninvested in reserve fund after deducting a loan of $1,997.41 to the current account.

Vice-president Bruch invited the agents present to give their views as to the difficulties met with in securing new members, and a lengthy discussion ensued. The majority of the speakers believed that the greatest benefit would be derived by giving the secretary competent assistance in order to enable him to make periodical visits to the larger cities where there is a field for personal solicitation. The matter was referred to the executive committee with power.

The constitution and by-laws were amended fixing the date for holding the regular annual meeting of the Association on the second Wednesday of March instead of the third Wednesday in November as heretofore. This action was taken in order to avoid the duplication of labor involved in the preparation of two reports, one for the members at the annual meeting and one for the state insurance department, under whose jurisdiction the Association is conducted. It was therefore resolved that the next meeting of the Association be held in New York on Wednesday, March 14, 1913.

In accordance with the resolution passed at the last annual meeting, section 2 of article IV of the constitution was amended to provide that the executive committee consist of six members, and that the officers and past presidents of the association shall be *ex-officio* members of the committee.

The election of officers resulted as follows: President, Belvidere Brooks; first vice-president, Charles P. Bruch; second vice-president, S. S. Garwood; secretary, M. J. O'Leary; treasurer, A. R. Brewer. Members of the executive committee, to serve three years, E. J. Nally and W. J. Lloyd. Auditing Committee, H. D. Reynolds, T. E. Fleming, W. J. Dealy.

Mr. James Merrihew resigned as a member of the executive committee and the vacancy was filled by the election of S. H. Marriot, auditor of receipts American Telephone & Telegraph Co., Long Distance Lines Department. Mr. Merrihew, being a past-president, is an *ex-officio* member of the executive committee.

Those present were:

Boston—P. J. Farrell.
Bradford, Pa.—J. E. Golden.
Buffalo, N. Y.—H. D. Reynolds.
Chicago—F. D. Bermke.
New York—W. E. Athearn, W. J. Austin, W. H. Baker, W. H. Brahe, T. Brennan, A. R. Brewer, C. P. Bruch, R. I. Courtney, F. E. Coyle, C. M.

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Cunningham, T. J. Cusack, W. J. Dealy, D. H. DeBaun, L. Dresdner, J. W. English, R. Ferguson, T. E. Fleming, F. G. P. Griffith, A. M. Guest, F. C. Halstead, Wm. Holmes, E. F. Howell, F. E. Hutchinson, G. Irving, H. C. Lockwood, A. A. Lopez, A. B. McCoy, J. F. McGuire, H. T. Marks, W. A. May, W. H. Mayer, R. J. Murphy, M. J. O'Leary, F. O'Ryan, E. B. Pillsbury, M. W. Rayens, E. N. Robinson, W. D. Schram, W. O. Snyder, J. B. Taltavall, W. O. Tremaine, A. G. Waring, W. W. Woodring.

Philadelphia—C. E. Bagley, E. W. Miller, S. S. Garwood.

Providence, R. I.—G. H. Mills.

Wilmington, N. C.—W. P. Cline.

Washington, D. C.—J. W. Collins.

The San Francisco Western Union Office.

On November 12, 1907, San Francisco's main office of the Western Union Telegraph Company was moved from West Oakland, at which point it was established at the time of the great conflagration on April 18, 1906, to the corner of Pine and Montgomery Streets, San Francisco. The home-coming was looked forward to with much pleasure. The move from the temporary frame building on the Southern Pacific right-of-way, which housed some two hundred operators for over two years, to more comfortable quarters in a brick structure was made one Saturday night and Sunday and the task of moving switchboards, dynamos and the instruments a distance of about six miles, together with the numerous connections necessary in the underground and submarine cables was accomplished without interruption to traffic. The force had by that time however learned how to overcome difficulties and meet emergencies. For two and a half years while the rehabilitation of San Francisco was going on a large volume of business was handled at this temporary office under the most trying conditions. The greater part of the force was picked up almost destitute and had to be clothed, fed and housed until they could get a fresh start. The equipment was quickly assembled from different parts of the United States and there was nothing uniform, in other words it did not fit. The supply of electric power was unreliable and there was a very troublesome gas engine for reserve. The working tables were made of rough boards; the facilities were crowded; the wind whistled through the cracks and the rain dripped from the ceiling, so there was great joy when these things were left behind.

At that time it was believed that the company was moving into quarters adequate to provide for many years growth, in fact some space was leased to outside parties, but the business and organization has long since outgrown its confines and the adjoining building has been annexed as well as a portion of another across the street. The growth of San Francisco was not stunted by its partial destruction; it is now a more beautiful city and the same large commercial center. With it grows the business of the Western Union and with the opening of the Panama canal and the building of the great exposition the company will be reaching out for more room within the next two years.

Many of the older executive heads who have faithfully carried the burden of their duties for years have transferred their charges to younger and more energetic men who are thoroughly alive to the situation and who are fast making the service popular, and at the same time making their employes more comfortable. There are both women and men's rest rooms furnished with easy chairs and lounges, and there is a matron in charge of the women's room where tea, coffee and light lunches are served.

There is a telephone office adjoining the main operating room where telegrams are received and delivered by telephone. It is complete in every respect, and lately the telegraph multiplex sets, dynamos and switchboards were moved to the fourth floor and with credit to division plant superintendent R. W. Gray, San Francisco possesses one of the best equipped and wired multiplex rooms of the system. Presiding over this room are Messrs. W. H. Wilson, T. J. Crow, S. B. Mills and G. H. Gilbert, days, and Messrs. J. A. Lowery, W. A. Warrensford and E. C. Davis, nights,—all competent wire and equipment men.

In the annex, adjoining the main operating room are located the printers and Wheatstone sets. This department is in charge of Messrs. R. W. Wells and W. L. Glasheen, printer experts, assisted by G. Hohenschild and J. W. Biller.

Mr. H. S. Converse is day chief, Mr. C. E. Donnelly night chief, Mr. A. A. Marlatt first trick traffic chief, assisted by Messrs. C. A. Rawlinson, J. E. Mifka and S. N. Shaplin. Mr. T. McGuiness is second trick traffic chief and Mr. O. D. Walters all night chief, assisted by Messrs. C. F. Woodward, J. B. LeCompte and W. R. Melville.

Quick Restoration of Telephone Service in Kansas City.

The Missouri and Kansas Telephone Company's Fairmount Exchange at Kansas City, Mo., was completely destroyed by fire at 3 a. m. Sunday, October 22. The telephone company at once communicated with the Western Electric Company and the work of restoring service to the subscribers was begun at 9:00 o'clock of the same morning. The Hawthorne factory of the Western Electric Company was called upon by long distance telephone to make a hurry-up shipment, and it sent the necessary apparatus by express the evening of the day on which the fire occurred. Twenty-six installers reported for work on Monday morning, October 23, and from that time until the new board was cut in service at 5:00 a. m. October 26, with a full equipment of 800 subscribers' lines, a day and night crew were at work continuously.

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Mr. Irwin's Experiences on the Air Ship "America."

The following interesting story by Mr. John R. Irwin, wireless operator of the airship "America," is published in the "Marconigraph" of London. It was the object of the expedition, it will be remembered, to make the passage from America to England by means of the airship, but the ship was lost at sea and the rescue of its crew by the steamer "Trent" is still fresh in the minds of the people.

Mr. Irwin's story is as follows:

In August of last year I was assigned to duty on the airship "America," then in course of construction at Atlantic City, N. J. On October 15, at 8 a. m., the airship left Atlantic City, and by 10 a. m. on the same day I had joined my earth to the equilibrator and opened communication with the station on one of the Atlantic City piers.

The quarters allotted to the wireless apparatus on the vessel were certainly the strangest an operator ever found himself in. Under the main car of the huge dirigible was suspended a lifeboat 27 ft. long, with a 6-ft. beam and 4½ ft. in depth. At each end was a 9-ft. water-tight compartment, and the forward one was divided off into a 2-ft. compartment, opening into the cockpit. This was the Marconi cabin. In this space my small set was placed while I worked from the open cockpit.

The Marconi Company had guaranteed Mr. Vaniman only a 30-mile radius with the set installed, which consisted of a 10-in. coil (worked from 25-volt accumulators) with a specially constructed loose-coupled jigger, field type of magnetic detector, and a small variable condenser. To recharge our batteries we carried a small 25-volt dynamo, which was belted to one of the main engines. As an antenna we used the main car of the airship, consisting of hundreds of feet of steel tubing, tanks and wire, with a capacity unknown. The celebrated equilibrator, consisting of 40 steel tanks filled with gasoline, threaded on a ½-in. steel cable, which, trailing in the sea, was used as a "ground."

I never experienced such a feeling of joy and relief as I did when "Ax" reported signals good and strong. All the members of the crew had their eyes on me, and all realized what an important part wireless would play in the expedition. Until 4 p. m. on the day of the start I maintained constant communication with Atlantic City, sending bulletins of our progress and receiving encouraging messages and weather reports from the shore. An hour later, although able to read every station along the coast, I was unable to reach any of them. I estimated that we were fully 100 miles off shore, and was particularly pleased with the success of the apparatus so far, and trusted to communicate with incoming liners from Europe during the night. We had departed in a dense fog, and on leaving the hangar, we were lost to view in less than a minute. This fog lasted for two days and nights, and everything was saturated with water. It also added great weight to the lifting capacity of the airship, and resulted in the car flying very low to the water. During the first night we passed three vessels, and almost collided with a big, four-masted schooner, which we missed by less than a ship's length. This was our first "thriller." During the night I repeatedly tried to communicate with vessels, but without success. With the immense aerial I had, the signals came in like hammers, and gave me the impression they were nearer than they actually were.

At 9 a. m. I communicated with Siasconset (my old station), remaining in touch with it until 1 p. m. During the previous night a mishap occurred to the engine to which the dynamo was attached, the ball bearings in the shaft being defective, and we were obliged to shut down. I was then unable to recharge my batteries and began to economize on my electric energy. On Sunday afternoon the wind developed into a gale with a very rough sea, and it was then that our troubles began. The constant condensation of fog on our immense gas-bag was still keeping us too close to the water; some of the gasoline was therefore jettisoned, and when night fell the contraction of the hydrogen gas again brought us perilously near the sea. We were forced to throw overboard the now useless engine and dynamo. This relieved the strain of the jerking equilibrator, and the night passed without further danger.

All Sunday night I could hear the steamer "Main," and called at intervals. The vessel appeared tantalizingly close. No one can realize my disappointment when I failed to get in touch with it. At this time we were driving along with a 45-mile wind taking us in a south-easterly direction and out of our course. On Monday, the third day out, the wind slackened somewhat, and took us due south. All prospects of reaching Europe had gone, and we began to think seriously of some way to get back home. Monday turned out to be a beautiful, warm day, and the expanding gas caused the airship to soar thousands of feet skyward, the highest altitude we attained being 11,900 ft. I felt nothing unusual at this high altitude, but had a peculiar ringing sensation in my ears when ascending and descending. Monday night was to prove an eventful one. We had a glorious moon, and all hands stood watch, keeping a sharp lookout for a ship. I heard a Royal Mail boat working during the earlier hours of the night, and realized that she might be bound our way from the West Indies.

At 3 a. m. Tuesday, Mr. Wellman called all hands with the glad tidings of "ship in sight." I immediately called C.Q.D. and S.O.S., but received no response. So, seizing an electric torch, I commenced calling in Morse lamp fashion. After some little delay I was answered by the steamer. I conveyed to them by lamp the fact that we were equipped with wireless, and in a few minutes the most welcome signals I ever heard came hammering in my telephones.

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The steamer proved to be the Royal Mail S. S. "Trent." From this time, until we launched our lifeboat at 8 a. m., we were in constant communication, receiving and sending orders, advice, and suggestions. We were then drifting at the rate of 12 miles an hour, and asked Captain Downs to follow us till daybreak, when we would be better able to see how we could free ourselves from the airship.

The "Trent" was then from 10 to 15 miles distant, and by 7.30 a. m. was alongside. We then informed them by wireless that we would descend and launch out boat the gas valve was opened, and gradually we descended to the water. When within 6 ft. the boat releases were opened, and she fell beam on into the sea, which was fairly rough at the time. She lurched gunwale under several times, shipping several inches of water. She then righted, and the heavy steel equilibrator struck us as the gasbag shot skywards. It knocked a hole in the air compartment of the boat containing the wireless apparatus. This, however, did not impair the stability of the boat. I also got a stunning blow in the forehead. Before we could recover from this excitement, perhaps the most anxious moment of the three eventful days occurred. The "Trent," about 100 yards away, bore right down on us, making 17 knots. It looked as if nothing could save us from being run down. She missed us, however, and, after a narrow escape from swamping, we fell astern about two miles. The steamer came about and ranged alongside us. Once more ropes were thrown, but she was making too much headway for us to hold them. They next came to us stern on, and in a few minutes we were aboard, boat and all.

In July of this year I returned east, and was offered the position of Marconi operator with Vaniman's new airship, "Akron," in which he will again tempt the fates in an attempt to reach Europe by dirigible balloon. I promptly accepted, and am now assisting in its construction. The new airship will be 258 ft. long; it will contain 400,000 cubic feet of hydrogen, and will have a lifting capacity of 13 tons. It will have a total maximum engine capacity of 317 horse-power, and will carry a 3-kw. Marconi set of special construction.

Mr. J. S. Berger, manager of the Lexington, Ky., Western Union office, writes: "While I have been a subscriber to your journal only one year I must say that it is a very interesting paper, and I look for it on the first and sixteenth of each month as much as I do my salary."

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.

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's "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.]

TELEGRAPH REPEATERS.

Why are repeaters necessary on telegraph lines?

How does electricity escape from telegraph wires?

What law causes a weakening of current on telegraph lines?

What is accomplished by inserting repeaters on long lines?

Is it necessary to insert repeaters on short lines?

What is the general rule for determining the intervals between repeaters.

How did Prof. Morse propose to obtain the best effects on a telegraph line?

What were the objections to his proposed method?

How much did Prof. Morse's first magnets weigh?

Why were Prof. Morse's early electromagnets feeble in action?

How did Prof. Morse propose to prolong his circuit?

What name did he give the instrument he used to repeat from one section of his line into another section?

When was the Woods button repeater introduced?

Why is it necessary to use a "button" in this form of repeater?

Name some of the advantages of this repeater.

What is the principal objection to this form of repeater?

Who was the inventor of the first automatic repeater?

In what principal respect does an automatic repeater differ from a button repeater?

Of the many automatic repeaters invented which one was adopted as the standard by the Western Union Telegraph Company?

What repeater is generally used in Canada?

Trace the connections of the Milliken repeater.

Why are the transmitters of Milliken repeaters provided with buttons, or switches?

On what notable circuit was the Milliken repeater formerly used?

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands . $2.00
Canada 2.50
Other Foreign Countries 3.00

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J. B. TALTAVALL, - - - Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
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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.

December 1, 1911.

The Passing of 195 Broadway.

The building known as One-ninety-five Broadway, New York, the Mecca of American telegraphers, with all of its associations and traditions, is doomed to demolition. It does not measure up to the standard of modern business requirements so it has been practically decided to pull it down and erect in its place a modern "sky scraper." As it has been aptly stated, the income of the present building is too low in proportion to the value of the site upon which it stands and there is only one way to increase the revenue-producing power and that is to build a structure of the modern type. When the present building was erected in 1872-1873 it was a model of its kind, but in the rapid march of progress standards of today become obsolete to-morrow. There were no steel cage structures in those days, the walls being depended upon for strength and support.

It has often been remarked that much valuable space in the present structure is filled with mortar and brick, and so there is, viewed from the present-day standards.

While there will be thousands who will regret to see the old building go, there is a little consolation left in the thought that the change will not take place in its entirety at once. The rear section of the structure, on Dey Street, will, according to announcement, be erected first, and the main section, on the corner of Broadway, later. The company's plans as to details are not sufficiently matured to enable us to give even an approximate outline of the final work.

The Telegraphers' Mutual Benefit Association.

The Telegraphers' Mutual Benefit Association is an organization that the great telegraph and telephone fraternities should be proud of, for it has a standing among fraternal organizations that probably has never been equalled, yet with a little effort on the part of its members it could easily be made twice as strong as it is. There is a point in this connection that perhaps not all of the members realize and that is the greater the number of young members brought into the association the less will be the cost to the individual members for their insurance. The young men are easier to bring into the society, and every present member should exert himself to gain an additional one and thus, while making the association stronger, reduce the cost to himself.

The report of the association for the fiscal year just closed, which is summarized on another page of this issue shows the association to be in a satisfactory condition. It has paid out to beneficiaries of deceased members no less than $1,671,000 since its organization. This is an excellent record for an organization of limited membership, and the figures represent comfort and relief from want in many homes.

Of the thousands of telegraph and telephone employes throughout the country only a small percentage are members of the association and there is no good reason why this disproportion should be so great. Every member should help to build up the organization and aid in making its position stronger by adding to its membership.

Independent Thinking.

One great trouble with the world today is the lack of independent thinking. Thinking is mental work, and a great many people abhor work of any kind. They are satisfied to let others do the thinking for them as that relieves them of the trouble. They are simply followers and rarely have any ideas of their own. The leader is always one who thinks for himself, and it is by reason of this fact alone that he is a leader. The follower consciously or unconsciously looks up to the leader for direction. If he is in doubt about anything he is likely to think or do as his model does and rarely ever thinks of investigating for himself the facts and truth of the subject in hand.

The masses place too much confidence upon what others say, and those who do the saying and leading, fully understanding this weakness of human nature, are in a position to take advantage of the weaker mentality of their brothers if they are so inclined.

This explains why so many people yield to the plausible stories of promoters of shady enterprises and part with their money on the promise of large financial returns. If the victims would take the trouble to investigate these schemes themselves before yielding to the allurements of the wily promoter, there might not be so many "get-rich-quick" concerns for Uncle Sam to place on the black list. The men at the head of these schemes are thinkers, and they know full well

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that they would not find their illegal schemes profitable if all men were thinkers too.

If people would do their own thinking and not allow themselves to be wholly controlled by the minds of others, there would be much less discord and unhappiness in the world.

Patenting Inventions.

Telegraphers in general, are a bright and wide awake lot of men, and as a rule have had varied experiences. Most of them are observing and are not satisfied with what they see on the surface; they want to know the why's and wherefores of things and they become investigators and thinkers.

Being associated with telegraph instruments of all kinds, chemical batteries, etc., they naturally acquire a desire to learn how the instruments are constructed and why they work, and how and why the mixing of certain chemicals in water produces electricity. Many telegraphers think deeply on these things and in many cases their investigations and study lead to inventions and improvements in the apparatus around them. When they accomplish such results they are naturally elated, and it is just at this point that they are in danger of being led into trouble.

It is very easy for a novice to believe that what he discovered in his investigations or what improvement he thinks he has made over existing methods, is new, and the first thing he turns his attention to is to procure a patent. Right here is where he needs advice and the exercise of sound judgment. In eight cases out of ten he will find, on investigation, that many others have travelled over the same ground and accomplished what he has done in perhaps a better way. Therefore it is always safe to "make haste slowly" when the patentability of an invention is concerned.

Our advice is frequently asked as to patenting so-called inventions. We never hesitate to recommend that the case be put into the hands of a reliable patent attorney with a request to make a search of the records at Washington to see if the same thing has not been patented before.

Quite recently we were requested by a gentleman to aid him in getting a patent on what he thought was something new. We advised him to have a search of the records made and gave him the name of a reliable attorney to look into the matter. The attorney found that the same thing had been patented years before, and what the gentleman thought was really a new thing turned out to be an old idea. He saved many dollars by taking this precaution. If he had applied for a patent, without a preliminary investigation, it would have cost him at least ten times the price of the search before he found out that his invention was not new and someone else had preceded him.

Any one who has a tendency toward improving and inventing things should keep posted as to what others have done along the same line of work. This can be done only by reading the records bearing upon the particular subject, and before he has gone far in his search he need not be surprised if he learns that others have done the same thing before, in a better way perhaps.

We do not want it to appear that we are discouraging invention. Far from it; we encourage it at all times. The point we wish to make is that if a person thinks he has discovered something new he should first ascertain what others have done along the same line, and if he learns that he has a reasonably clear road to himself, then have a search made in the patent office for anticipations. If this results in a favorable report then make the application for a patent, and not before.

The Way to Rise.

Abraham Lincoln once said: "The way for a young man to rise is to improve himself in every way he can, never suspecting that anybody wishes to hinder him.

"Allow me to assure you that suspicion and jealousy never did help any man in any situation. There may sometimes be ungenerous attempts to keep a young man down; and they will succeed, too, if he allows his mind to be diverted from its true channel to brood over the attempted injury.

"Cast about and see if this failing has not injured every person you have ever known to fall into it."

Taxation of Telegraph and Telephone Properties in Ohio.

The Ohio State Tax Commission has fixed tentative valuations upon a few of the large telegraph and telephone properties.

Increases in the valuation of telegraph properties in the State are as follows: Postal Telegraph-Cable Company, from $397,550 to $796,500; Western Union Telegraph Company, from $2,335,375 to $4,045,680; Put-in-Bay Telegraph Company, from $1,800 to $5,000.

The valuation of telephone properties was fixed last year at $21,000,000; this year it is believed the figures will reach $55,000,000.

Competition in Public Utilities.—A novel point with regard to the effect of state regulation of public utilities has been raised by the New York Edison Company in relation to the competition that it appears it will now have to face from the Long Acre Electric Light and Power Company. It contends that since in its service and rates it is obliged to submit to the regulations laid down by the Public Service Commission, it is the duty of that commission to protect it against competition. It further demands that if competition is permitted in its most profitable districts, it be relieved of regulation and allowed to meet competition in those districts at competitive rates without reference to the rates in non-competitive districts.

The best way to keep posted in telegraphic and telephonic progress is to read TELEGRAPH AND TELEPHONE AGE. Subscription price $2 per year.

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

(*Copyrighted.*)

(Continued from page 770, November 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 will be 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.

DECIMALS (*Concluded.*)

RULE (8). *If in dividing one whole number by another there be a remainder, annex ciphers to the remainder and continue dividing until there are three or four decimal places in the quotient, and then if there still be a remainder, terminate the quotient by the plus sign (+), which shows that it can will be a whole number.*

Example: Divide 19 by 7.

Solution:

$$7\,|\,19.0000$$
$$2.7142 + \text{ Ans.}$$

RULE (9). *When the divisor and dividend contain the same number of decimal places the quotient will be a whole number.*

Example: Divide 1.5 by .5.

$$.5\,|\,1.5$$
$$3. \text{ Ans.}$$

RULE (10). *When the divisor contains more decimal places than the dividend, supply the deficiency in the dividend by annexing ciphers..*

Example: Divide 20 by .05.

Solution: There are two more decimal places in the divisor than in the dividend, therefore annex two ciphers to the latter, thus, 20.00.

By Rule 9 the quotient is now in units, or whole numbers.

$$\frac{20.00}{.05} = 400 \text{ Ans.}$$

Example: Divide 8 by .3.

Solution: Supplying the deficiency in the dividend gives 8.0.

Dividing, $.3\,|\,8.0$

26. and 2 remaining.

Carrying out to four decimal places gives

$$.3\,|\,8.00000$$
$$26.6666 + \text{ Ans.}$$

NOTE: The dividend has now four more decimal places than the divisor, and by Rule 7 four decimal places must be pointed off in the quotient.

PROPORTION.

Two quantities are said to be *directly* proportional, or simply proportional, when any two values of the first quantity have to one another the same ratio as the corresponding values of the second.

Thus, when two quantities are connected in such a way that when one is increased two, three, four, ... times, the other is also increased two, three, four, ... times, they are in direct proportion.

Two quantities are *inversely* proportional when any two values of the first quantity have to one another the inverse ratio of the corresponding values of the second.

Thus, when two quantities are connected in such a way, that when one is increased two, three, four, ... times the other is diminished two, three, four, ... times, they are inversely proportional.

A proportion may be indicated by the double colon : :, or the sign = .

Thus, 8 : 4 : : 6 : 3.

or 8 : 4 = 6 : 3

are the two ways of expressing the proportion which is read: 8 is to 4 as 6 is to 3, or, the ratio of 8 to 4 is equal to the ratio of 6 to 3, which means the same as $\frac{8}{4} = \frac{6}{3}$.

In proportion the terms are numbered first, second, third and fourth.

The first and fourth terms are called the *extremes;* the second and third terms are called the *means.*

RULE (1). *In any proportion the product of the means equals the product of the extremes.*

Thus, in the proportion

12 : 10 : : 6 : 5

$12 \times 5 = 60$, is the product of the extremes, and equals $10 \times 6 = 60$, the product of the means.

RULE (2). *The product of the extremes divided by either one of the means gives the other mean.*

NOTE: When one of the terms is not known let x or some other letter represent it.

Thus, 8 : 6 : : 20 : x.

Example: Find the second term in the proportion

8 : x : : 20 : 15.

Solution: The product of the extremes is $8 \times 15 = 120$.

Dividing by the given mean.

$\frac{120}{20} = 6$, or the second term. Ans.

RULE (3). *The product of the means divided by either of the extremes gives the other extreme.*

Example: Find the first term in the proportion.

x : 6 : : 20 : 15.

Solution: The product of the means is $6 \times 20 = 120$.

Dividing by the extreme;

$\frac{120}{15} = 8$, or the first term. Ans.

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Before solving any proportion cancel any factor which is common to the first and second terms. Thus, in the proportion

$$8 : 6 : : 20 : x$$

the common factor 2 may be cancelled, leaving

$$\overset{4}{\cancel{8}} : \overset{3}{\cancel{6}} : : 20 : x.$$

$$20 \times 3 = 60.$$

$$\frac{60}{4} = 15, \text{ or } x. \quad \text{Ans.}$$

In all cases of proportion there are three terms given; the fourth has to be found. It does not matter where x, or the unknown term, is placed; it can always be found by applying the above rules.

The first question the student must ask himself in every calculation by proportion is: "What is it I want to find?"

Example: If 45 sheep cost $565 what will 140 sheep cost? Here it is cost that is wanted, so if x, or the required cost, be made the fourth term of the proportion, the given cost in the problem will be the third term. $565 will therefore be the third term of the proportion. Of the two remaining numbers given in the problem the *greater* will be the second term when the answer is to be *greater* than the third term, and the *less* will be the second term when the answer is to be *less* than the third term.

In this case 140 sheep will cost more than 45, therefore 140 will form the second term and 45 the first, giving,

$$45 : 140 : : \$565 : x$$

$$\frac{565 \times 140}{45} = 1757\tfrac{7}{9}.$$

Therefore, $x = \$1757\frac{7}{9}$. Ans.

Example: If 9 men can build a wall in 15 days how long will it take 5 men to build it?

The 15 days is the third term since the answer is to be in days.

It will take 5 men longer than 9 men to build the wall, therefore the proportion is

$$5 : 9 : : 15 : x.$$

$$x = 27 \text{ days.} \quad \text{Ans.}$$

(To be Continued)

The Balloon as a Wireless Telegraph Receiving Station.*

BY P. LUDEWIG.

As very little has been published regarding the wireless stations which are fitted on balloons, the author determined to describe some tests on this subject made by him at the beginning of the year. The object of these tests was to pick up with the simplest arrangement of apparatus the waves sent out from wireless land stations.

The crux of the problem lay in the arrangement of the antenna, which was made in two parts, between which the receiving apparatus was connected. As regards the receiving apparatus itself, a choice was made of those employed in practice.

The following was the arrangement employed: When the balloon was half filled a wire was wound round the equator of the gas bag, being interwoven through the protecting cordage; and the end of the wire was placed in the basket. This wire formed the upper half of the antenna. To form the lower half a heavy wire was dropped from the basket after the balloon had risen.

As the object of the tests was to discover with how simple means picking up of messages was possible, a very simple apparatus was chosen. A Schlömilch cell was used as receiver, and this was connected direct to the antenna, in order that the room taken up should be as little as possible. With this arrangement accurate tuning was, of course, impossible. Approximation to the wave length of 500 metres at the sending station was obtained when the wire from the basket was 125 metres long, or equal to one-quarter the wave length.

The choice of some simple receiving station also solved the problem as to whether damped or undamped waves should be used for sending, the small tuning capacity of the receiving station making the use of the first-named a necessity. As sending station the 30 m. (100 ft.) high "T" antenna at the Electrotechnical Institute of the Frankfort Physical Society was used. This station employs the Braun method, hightly damped waves with close coupling being used.

During the first tests in March, 1911, which lasted two hours, the balloon was 50 km. (31¼ miles) away at a maximum height of 600 m. (2,000 ft.) from the ground. At this height the signals received were not so clear as when the balloon was lower down.

During a second test on March 23 three balloons were used, the stations at Göttingen, Darmstadt, Karlsruhe and Frankfort being employed for sending. The first three of these transmitted singing sparks, the latter working on the Braun system with a frequency of 50. The signals from Frankfort and Darmstadt were heard quite easily, but the other two could not be heard. During the time Göttingen was sending, signals with a frequency of 50 were received, and a message was received so quickly as to be unintelligible. Subsequent inquiries show this to have been transmitted from the balloon belonging to the Telegraph Battalion at Coblentz.

*Abstract of an article in the "Physikalische Zeitschrift."

New News Association.—The American Telegraph Press, Inc., has been organized in Washington, D. C., to gather and distribute news. Mr. Winfield Jones, of Washington, is president and general manager; G. Grosvenor Dawe, vice-president; Dr. Clarence J. Owen, secretary and treasurer, and A. E. L. Leckie, general counsel. The American Telegraph Press plans to operate in fields which its projectors consider are not fully covered by the other large press associations of the country, and in addition will conduct a feature and general news service from Washington. It will start immediately with a leased wire service between Washington and New York, extending its wires to other places as rapidly as possible. The headquarters of the corporation will be in Washington.

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Multiplex Telephony and Telegraphy.

In discussing the paper of Major George O. Squier, entitled "Multiplex Telephony and Telegraphy by Means of Electric Waves Guided by Wires," read at the Chicago meeting of the American Institute of Electrical Engineers, Dr. Frank B. Jewett stated that the problem of applying a high-frequency method of transmission to an existing wire plant would be an exceedingly difficult one. Furthermore, if the system were to be of any great value in a commercial plant it could not be limited to a single frequency, but would require a large range of frequencies. With such a range of frequencies the range of energy which must be supplied to lines of similar length will be very great if uniform transmission is to be given. While this might not be a serious objection in a plant comprising only a few toll lines, it becomes one of very great importance when a comprehensive net work has to be taken into account. He did not see how this difficulty could be overcome in a way that would admit of applying this kind of a system to the complicated requirements of a commercial wire plant. Referring to transposition of wires he said that on well transposed lines for ordinary talking circuits the transposition poles occur on the average at between one-half and one mile apart, say, from twenty to forty poles apart. When we come to consider high-frequency currents of from 15,000 to 100,000 alternations, with their very much shorter wave length, the same number of transpositions per wave length would require additional poles. He had failed to satisfy himself that there is any affirmative answer to the engineering questions which must be satisfactorily answered before there is any possibility of applying Major Squier's invention generally to a commercial plant used for universal service.

Mr. John B. Taylor said that the system of multiplex telephony under discussion is a resonance method making use of intensity variations in the strength of an alternating current of frequency greater than that to which the standard telephone receiver and human ear are sensitive. Major Squier refers to the possibility of solving the problem by the use of a similar method in which the transmitted alternating currents are of frequency below those to which the ear is sensitive, or in the neighborhood of 16 cycles per sec., but has apparently dismissed this from serious consideration on account of the difficulty of securing a pure sine wave. It may be well to point out here that entirely apart from any question of difficulty in securing a perfect sine wave of the frequency of 16 cycles or lower, that such a system is fundamentally wrong for purposes of speech transmission. Fairly rapid speech may have as many as ten distinct syllables in each second, so that one or more of these syllables occurring at or near the zero part of the 16-cycle wave, would be either entirely lost, or of such low intensity compared with those syllables occurring at or near the peaks of the 16-cycle wave, as to seriously change the quality of the speech. This is not equivalent to saying that speech over such a low frequency system could not be recognized, but that the distortions are so great as to debar the matter from serious practical consideration.

Mr. S. G. McMeen, in referring to Dr. Jewett's comments, said all reactances required in Major Squier's methods, whether of capacity or inductance, are of small dimensions because of the high frequencies. Dr. Jewett said that Major Squier's invention was "a beautiful laboratory apparatus," but he (the speaker) reminded him that the telephone itself was that, and that only, when Professor Bell finished it.

Mr. Frank F. Fowle stated that Major Squier's achievement in duplexing a telephone circuit by superimposing waves of a frequency beyond the range of audibility, will rank high among scientific accomplishments.

Mr. Béla Gáti, of Budapest, Hungary, gave an account of some experiments made by himself in high frequency telegraphy and telephony. With high frequency currents, he said, the speed is unlimited. He succeeded in sending from 20 to 60 letters per second. The signals were not intermixed, and the incoming signal was not expanded as in direct-current telegraphy. He had made experiments over a 4,000-km. (2,500-mile) line on which the direct-current signals were expanded perhaps 300 per cent, while the alternating-current signals were not expanded at all.

Referring to telephoning with high frequency currents he said he had proved mathematically the possibility of talking between London and Kurachi, India, a distance of 8,000 kilometers (4,970 miles).

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.

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Dry Cell Testing.*

BY W. B. PRITZ.

There are to-day at least 100 brands of dry cells upon the market, varying in quality from very efficient and reliable cells to those which must be considered very inefficient; and from these the consumer must select that brand which in his opinion will give best service. Before any conclusion can be reached regarding the adaptability of a cell to a particular service, the consumer must either accept the guarantee of the manufacturer or make for himself, as best he may, a service comparison of the cells in question.

The present diversity in the methods of testing cells is very troublesome for both the manufacturer and consumer. The former is often called upon to guarantee the service of his product when subjected to certain tests which have little or no relation to any which he may have adopted, and although it is not impossible, it does become quite difficult for a manufacturer of dry cells to calculate from the results of his regular tests just what may be expected of his product when subjected to a particular test required in the specifications of his customer. The adoption of some standard tests which would hold between manufacturer and consumer alike would, therefore, be very advantageous to both. The establishment of such tests and the publicity which would thereby be given to the whole subject of testing would decrease the tendency of the small consumers (who, taken collectively, must use a considerable percentage of the output) to place reliance in the so-called tests which now form the basis for their judgment of a brand of cell, such as amperage or voltage readings.

It is easily shown that there is in no sense a relationship between service and short-circuit current. It is true that the amperage reading of a cell, coupled with a familiarity with the particular brand, does serve as a good indication of the age of the cell or the presence of any serious defect; however, the customer who judges solely from the short-circuit current is very apt to obtain inferior quality, and yet we are informed by dealers that at least 90 per cent. of the customers who buy cells off the shelves demand that they be so read and in most cases select that brand giving the higher current.

Let us consider, then, the requirements of a satisfactory test for dry cells and the conditions which have the greater influence upon the results obtained. In general (other than for purposes of research) there are but two reasons for desiring a test upon dry cells: (1) To ascertain what life may be obtained from a brand of cells in a certain service; (2) 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 the 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—viz., the comparison of two or more brands of cells for use in a particular service. 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. This is, we take it, the one necessary condition which dry cell tests must fulfil.

There have been tests devised which seek to go further and make the operating conditions not only comparable, but as similar as may be to the operating conditions of the service for which the test is intended. Upon this point there is some diversity of opinion. Some authorities claim that a test is of greater value and is more reliable the more nearly the conditions of test approach those of service, and, following out these claims, have devised certain tests which are rendered quite complicated, requiring much attention and apparatus for their continuance, by the introduction into the method of some of the irregularities to be expected in service. It is questionable, however, if results of greater meaning are obtained from such strict adherence to service conditions. At best, such a test is but an approach to actual service, which must be continually varying from time to time and from locality to locality. Again, the apparatus necessary to carry on an irregular, intermittent test is very complicated and requires much careful attention. This feature limits its use to the large consumers and manufacturers.

Questions are often asked regarding the advisability of testing various brands of cells by connecting them in series and discharging them simultaneously. In general, we would advise against this method, though there are occasions when it is the only one that can be employed. Especially is this true when test conditions, such as length of contact and recuperation periods, strength of current and temperature of the battery, cannot be held constant for the separate testing of various brands. It is much preferable, for instance, to use the series method of test upon an automobile than to test the various brands upon different machines or upon the same machine at different times.

Temperature is a most important factor in dry cell testing, and a large part of the non-uniformity in the results of tests may, we think, be traced to temperature variations. For instance, the current increases as the temperature rises, and the differences in the current obtainable increase considerably as the temperature falls. The influence of temperature upon service is greater than it is supposed. Tests show great variations are obtainable between 15 deg. and 35 deg., between which values practically all testing is done. This

*Abstract of a paper read before the American Electrochemical Society.

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makes the importance of temperature regulation very evident. The effect of temperature also varies with the nature of the service, high temperatures giving longer service where the drain is heavy, while low temperatures are favorable for light drain service lasting over a considerable period. Of prime importance in dry cell testing is a knowledge of the effect of temperature upon the rate of deterioration of cells when left on open circuit. To determine just what this effect might be, a number of cells were stored at seven different temperatures. The following table gives the initial currents and the drop in amperage after ten weeks, expressed as a percentage of the initial values.

Temperature.	Initial amp.	Per cent. drop in amp. in 10 weeks.
5°C.	18.1	4.4
25°C.	22.0	10.0
35°C.	21.0	19.0
45°C.	22.8	25.0
55°C.	23.0	52.0
65°C.	20.5	71.0
75°C.	21.0	98.0

The greatly increased rate of deterioration on open circuit at high temperatures no doubt accounts for the poor service obtainable at such temperatures over long periods of time. A knowledge of this effect of temperature would undoubtedly explain the cases, which are at times brought to our attention, of cells rapidly deteriorating upon a dealer's shelves, from "no cause whatever." The cells should be stored in a dry, cool place, and not in the corner behind the stove.

In interpreting the results obtained from a test of various grades of cells a caution must be given against drawing definite conclusions from the outcome of a single or 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.

In regard to the terms in which the results of dry cell tests should be reported, there is some difference of opinion, some authorities contending that the ratings should be expressed as the number of ampere-hours given by a cell under specified conditions to a certain working voltage value. Others claim that more practical meaning is attached to a statement of the length of time during which the cell is able to maintain its working voltage above the specified limiting value. It is the author's opinion that that method of rating should be used which gives to the consumer the exact information which he desires, hence, the rating of cells by the length of service of a given kind which they are capable of giving is favored.

It is perfectly evident that the consumer is interested in the length of service which he is able to obtain from a battery and not in the amount of energy given. At first thought it might appear that the ampere-hour capacity of a dry cell bears such a relation to length of service, that either method of rating would give the same information. Such is not the case, however. Differences in discharge rate cause vast differences in the number of ampere-hours obtainable from the cell. From the nature of the discharge curve, it is quite difficult to calculate the length of service obtainable under the conditions limiting the ampere-hour rating, while to go further and deduce from the rated ampere-hour capacity under one set of conditions, the output to be expected under different conditions becomes a hopeless task. Equally hopeless is the final interpreting of the result in terms of length of service. Again, a dry cell does not always give length of service, which is proportional to ampere-hour output. It is easily possible to produce two dry cells which will give equal lengths of service the ampere-hour output of which will show marked differences. Hence a statement of the ampere-hour capacity of two brands of cells is very likely to be misleading, as it does not settle definitely which is the better cell to use upon a given service. For research purposes the energy or ampere-hour output of a cell is very useful, but as a practical rating for dry cells it is not satisfactory, especially from the standpoint of the consumer.

Wireless Telephony Through Water.

Exhaustive tests have recently been made by Mr. A. W. Sharman in England with instruments invented by him for telephoning through water without wires. The microphone used in speaking is connected in series with a battery of four or five dry cells and an impulse coil, the coil being of special construction and giving very short, induced currents of high potential, which are communicated to the water by two wires connected to the terminals of the coil and terminating in plates buried in the sand or submerged in the water. Two similar plates, connected direct with a very low-resistance telephone receiver, enable the speech to be "picked up" at distances of a mile and more.

The speech transmitted through the water has been very distinct, and the system has shown good possibilities for use as a means of verbal communication between two ships, such as a battleship and a submarine. The effect is very directional, and another advantage is that with a small tuned buzzer telegraphic signals can be transmitted through the earth or water for a distance of several miles. The primary energy required is extremely small, four watts sufficing to telephone over a distance of two miles.

Electrical Communication in Jamaica. — The telegraph system of Jamaica, which is operated by the Government, comprises 881 miles of line. There are also about 800 miles of telephone lines on the island, two submarine cable landings and one wireless station. Mr. Harry C. Wilson is superintendent of government telegraphs, with headquarters at Kingston.

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Electric Waves Directed by Wires for Intercommunication Purposes.*

BY MAJOR GEORGE O. SQUIER.

During the past twelve years the achievements of wireless telegraphy have been truly marvelous. From an engineering viwpoint, the wonder of it all is, that, with the transmitting energy being radiated out over the surface of the earth in all directions, enough of this energy is delivered at a single point on the circumference of a circle, of which the transmitting antenna is approximately the center, to operate successfully suitable receiving devices by which the electromagnetic waves are translated into intelligence.

The "plant efficiency" for electrical energy in the best type of wireless stations yet produced is so low that there can be no comparison between it and the least efficient transmission of energy by conducting wires.

The limits of audibility, being physiological functions, are well known to vary considerably, but they may be taken to be in the neighborhood of sixteen complete cycles per second as the lower limit and 15,000 to 20,000 cycles per second as the upper limit. If, therefore, there are impressed upon a wire circuit for transmitting intelligence harmonic electromotive forces of frequencies between 0 and sixteen cycles per second, or, again, above 15,000 to 20,000 cycles per second it would seem certain that whatever effects such electric wave frequencies produced upon metallic lines, the present apparatus employed in operating them could not translate these effects into audible signals.

Within the past few years generators have been developed in the United States giving an output of two kilowatts and above at a frequency of 100,000 cycles per second, and also capable of being operated satisfactorily at as low a frequency as 20,000 cycles per second.

The necessary conditions for telephony by electric waves guided by wires are an uninterrupted source of sustained oscillations, and some form of receiving device which is quantitative in its action. In the experiments described in multiplex telephony it has been necessary and sufficient to combine the present engineering practice of wire telephony and telegraphy with the engineering practice of wireless telephony and telegraphy.

The frequencies involved in telephony over wires do not exceed 1800 to 2000, and for such frequencies the telephonic currents are fairly well distributed throughout the cross section of the conductor. As the frequency is increased the so-called "skin effect" becomes noticeable, and the energy is more and more transmitted in the ether surrounding the conductor.

At frequencies of 100,000 cycles on wire circuits the phenomena may be considered as a "super-skin effect" or "film effect," where the actual mass of the metal conductor involved is but a small fraction of the total. At such frequencies the flow of energy is controlled by reactances in the ether surrounding the conductor, rather than by the ohmic resistance of the wire as in battery telephony and telegraphy, and when these reactances are balanced at the receiving end of the circuit by the process of electrical "tuning" the one hundred thousand small packages of energy in the form of electromagnetic waves, which are delivered in each second of time at the receiving end of the circuit are thus added together to produce a cumulative effect many times greater than without such electrical tuning process. Extra etherial "channels" of intercommunication are by these means provided without the expense of erection and maintenance of special wires for the purpose.

Furthermore it has been found possible to superimpose, upon the ordinary telephonic wire circuits now commercially used, electric waves of ultra-sound frequencies without producing any harmful effects upon the operation of the existing telephonic service. Fortunately, therefore, the experiments described are constructive and additive, rather than destructive and supplantive.

Electric waves of ultra-sound frequencies are guided by means of wires of an existing commercial installation and are made the vehicle for the transmission of additional telephonic and telegraphic messages.

The source of electric waves used in the experiments described was a special type of dynamo, capable of producing 100,000 cycles per second and also capable of operating regularly at 20,000 cycles. This gave a wide range of frequencies for tests over an actual commercial telephone line of about 776 ohms resistance and capacity of .7 microfarad. The cable being lead covered throughout, it practically corresponded to a submarine cable about seven miles in length. The generator was of the inductor type and the rotor operated at a speed of 20,000 revolutions per minute or would roll as a wheel from the United States to Europe in four hours. The friction, or adhesion, of the air against the rotor was so great at this speed, as to require five kw. to overcome this alone, although the total output of the machine is but 2 kw.

Severe tests were described to determine the efficiency of a single wire with earth connection as a circuit for commercial telephony by high frequency methods, and these tests showed that such circuits are entirely practicable for this work, thus doing away with the necessity of constructing two wires for a telephone toll circuit as is now required.

Since the inductance and capacities required for this range of frequencies are a thousand times smaller than those employed in battery signalling, the complete and absolute separation of two independent telephonic conversations on the same pair of wires was readily obtained.

The transmission of energy at these ultra-audible frequencies was so radically different from

*Synopsis of paper read before the New York Electrical Society, October 27.

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the phenomena at low frequencies by metallic conduction that the results very closely resembled pure radio-telegraphy. The energy waves were broken away from the source as from a transmitting antenna and thereafter had no perceptible reactive effect upon the source at the transmitting station. It was, therefore, not possible to tell from the transmitting station whether or not the distant end of the line was open or "shorted."

Since the loss of energy on the metallic "film" of the line in transmission is proportional to the square of the line current, it is permissible to put the energy in any form desirable for transmission and this is controlled by the ratio of transformation of the oscillation transformer at the transmitting station. With a ratio of but one to five excellent speech was obtained with a transmitting line current almost too small to be read on any commercial ammeter. In battery telephony this ratio is above 1 to 20, so that the line currents may be small and, therefore, line losses decreased inversely as the square.

The ringing circuit was operative both ways with no apparent effect on the high frequency telephone transmission. This ringing circuit developed a comparatively large alternating current flowing in the wire at about thirty cycles per second and at a voltage of many times that of either the high frequency or the battery side of the circuit.

Articulation tests, including music, numerals and other difficult combinations, gave satisfactory results, with no interference whatever between the two sides of the circuit.

By holding one telephone receiver to one ear and the other receiver to the other ear the receiving operator could hear two entirely different conversations simultaneously over the same pair of wires.

The distortion of speech, which is an inherent feature of telephony over wires, should be much less, if not practically absent, when we more and more withdraw the phenomena from the metal of the wire and confine them to a longitudinal strip of the ether which forms the region between the two wires of a metallic circuit.

The tuned electrical circuit at the receiving end readily admits electromagnetic waves of a certain definite frequency, and bars from entrance electromagnetic waves of other frequencies. This permits the possibility of utilizing a single circuit for multiplex telephony and telegraphy.

Investigating Business Methods.—The United States Senate Committee on Interstate and Foreign Commerce on November 15 began its investigation into modern business methods with a view to legislation for further trust control. The committee has plenary powers to conduct an investigation on the widest scope. Among the witnesses to appear will be Mr. Theo. N. Vail, president of the American Telephone and Telegraph Company and of the Western Union Telegraph Company.

Electric Club of New England.

Mr. C. F. Ames, district commercial superintendent of the Western Union Telegraph Company, Boston, Mass., made an address before the meeting of the Electric Club of New England which was held in Boston on November 10. His remarks were very entertaining and instructive, and he explained how since the new three-column arrangement of forces had been put into effect, every effort had been exerted by the commercial men of the district to increase the popularity of the telegraph service with the general public, by specializing the new types of service, such as the night and day letters, and the various methods which have been devised by the company's agents whereby customers have been shown how the new forms of service would be a positive benefit as order-getters. Great stress was laid on the value of politeness to customers by all telegraph employes, both by the clerical force, messenger boys and the telephone operators.

These points have always been emphasized by Mr. Ames and his staff, but only since the traffic and plant routine has been assumed by the other department heads has it been possible to vigorously follow up such lines of endeavor.

Mr. O. A. Conner, manager of the Boston district of the Western Union Company, also made a few remarks. He gave the club a vivid account of how difficult it is to obtain the actual hard cash from the public, that is, how hard it was to hold the present volume of business and get more. His remarks were very witty and optimistic, however, and he referred to the fine spirit of co-operation shown by the plant and traffic departments.

Other speakers were Mr. J. B. Rex, general traffic chief; Mr. J. A. Molloy, commercial manager of Boston branch offices, and Mr. J. A. Meldrum, cashier.

There were eighty persons present, this being the largest number in attendance at a meeting in the history of the Club, and attesting to the popularity of the subjects in hand and the speakers.

As was noted in these columns November 16, the Electric Club at this meeting voted to affiliate with the New England Telephone and Telegraph Society as an independent unit, to be called "The Western Union Chapter."

Dry Storage Battery.—A patent has been issued in England on a dry storage battery. The construction of the battery is briefly described as follows: The positive electrode is a carbon block of star-shaped cross-section, fitted into the center of a block of depolarizing material. The electrode is separated from a zinc electrode of square section by a series of cane strips ⅛ in. square to allow for air circulation. In charging the cell contact is made with the zinc through the moisture absorbed by the cane strips from the electrolyte. As the charging proceeds a spongy deposit collects on the zinc and makes a permanent porous connection between the zinc and the electrolyte.

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New System of Wireless Telephony.

BY CHARLES PRONER, NEW YORK.

Mr. Samuel Wein, a young wireless experimenter of New York, has conducted some novel and original experiments in the line of wireless telephony. It is stated that in a recent test he transmitted speech wirelessly a distance of approximately twelve miles.

The accompanying diagram shows the electrical connections.

In his system of wireless telephony, Mr. Wein claims to have overcome the difficulty of adjusting the arc lamp. He has applied the same principle to the arc as is used in the quenched spark system, and calls his system the quenched arc system. By the quenching of the arc he has discovered that the electrodes require no cooling.

The negative and positive electrodes used in the arc are of a special metal that increases the wave length about twofold. Instead of using a hydrogen blast on the arc, Mr. Wein places a

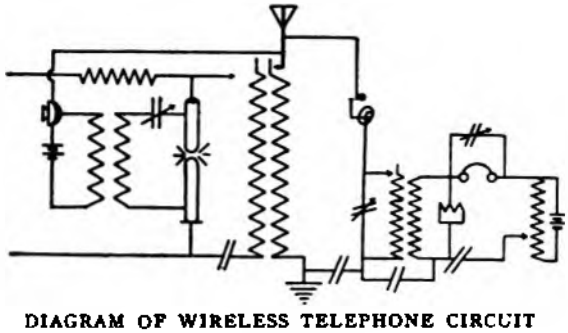

DIAGRAM OF WIRELESS TELEPHONE CIRCUIT CONNECTIONS.

spoonful of vaseline on each electrode; this being used in order to increase the frequencies of the arc.

The microphone employed in the experiment was tested and it is stated showed some remarkable results. It carried as high as 440 volts and 7 amperes on a closed circuit without burning or caking.

Contrary to the usual belief Mr. Wein finds that better results can be obtained by using hard metals firmly held between two pressure surfaces, as found in the carbon microphone. This microphone, it is stated, has been used successfully as a telephone relay with excellent results.

Patents are now pending on Mr. Wein's wireless telephone system.

Notes on Radio-Telegraphy.

The *Journal* of the Washington Academy of Sciences contains some notes from Mr. L. W. Austin of the United States Naval Wireless Telegraph Laboratory.

Wave Length and Ground Absorption of Electrical Waves.—Since the early days of wireless telegraphy, the country lying to the north and northeast of Newport, R. I., has been known to show a very large absorption for electrical waves.

During the experiments in long-distance radiotelegraphy carried on at Brant Rock, Mass., during the summer of 1910, the signals sent out by the "Birmingham," lying at Newport, were measured at Brant Rock, forty-five miles away. The wave-lengths used were 1,000 meters and 3,750 meters and the received signals were measured on a fifteen-ohm tellurium-constantine thermoelement. One millimeter on the thermoelement galvanometer corresponded to a current of 263 microamperes.

It was found that ninety-five per cent. of the energy was absorbed in the case of the 1,000-meter wave, while in the case of the 3,750-meter wave the ground absorption was not detectable, the observed signals being slightly stronger than the calculated values.

The experiment explains fully why with the short wave-lengths ordinarily used, wireless communication has been so difficult over this region and indicates that where such difficulties are encountered, longer wave-lengths should be employed.

Directive Action of the Marconi Bent Antenna at Clifden, Ireland.—While the directive action of the Marconi bent antenna at short distances has been amply demonstrated by Marconi, Fleming and others, it has not seemed certain that this radiation asymmetry would not diminish as the distance increased so that at great distances the radiation distribution would be the same as that of an ordinary antenna.

Recently at the request of the wireless laboratory, the National Electric Signaling Company made telephone shunt measurements on the signals received at its Brant Rock station from the Marconi transatlantic station at Clifden. These indicated an average received energy in the day time of 5×10^{-8} watts. I have been unable to obtain from the Marconi Company any data on the value of the antenna current at Clifden, but nevertheless some conclusions can be drawn from the information at hand. The distance from Clifden to Brant Rock is 2,640 nautical miles. The height of the Clifden antenna considered as a flat top is approximately 200 feet, the effective receiving height of the Brant Rock umbrella antenna was found in the recent long-distance experiments to be approximately 350 feet. The wave-length of Clifden is a little more than 6,000 meters and the total available power is 1,100 horsepower.

We may calculate that the sending antenna current was equal to 810 amperes, which is an enormous value. If the total antenna resistance is only one ohm, it corresponds to 660 kilowatts, which is more than the whole 1,100 horsepower would be able to transmit to the antenna. But this resistance is improbably small.

From this it must be concluded that unless the formula is grossly in error the bent Clifden antenna shows a decided directive effect even at this distance.

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Desiccators.*

BY J. G. HINES.

At a recent meeting of the Institution of Post Office Electrical Engineers the engineer-in-chief stated that, excluding distribution cable, the length of paper-core cable already in use exceeded 2,300 miles, and that this mileage was being steadily increased.

In the type of cable referred to the insulation resistance depends entirely, and the electrostatic capacity to some extent, upon the hygrometric state of the air in the cable. The subject of desiccation is therefore one of considerable and increasing importance.

In the department's specifications for paper-core cable a minimum insulation resistance of 5,000 megohms per mile is specified, but, owing to the method of drying adopted at the manufacturers' works, the insulation resistance obtained is generally greatly above the minimum.

The method of drying paper-core cables at cable factories differs considerably from that employed to dry cables *in situ*, and is undoubtedly more efficient, but unfortunately it is not practicable to apply the factory method to cables which are in conduits.

Although there are differences of detail, the principle of drying cables is the same at all factories. After a cable has received the outer layer of wires it is wound upon an iron drum and placed in an oven heated by coils of steam pipes. The door of this oven is sealed to prevent the entrance of damp air. The air in the oven is then withdrawn by means of air pumps, and partly replaced by air which has first been dried by passing it through cylinders containing quicklime, calcium chloride and cotton-wool in the order named. The flow of air is restricted so that a vacuum of about 21 in. of mercury is maintained in the oven. The conditions inside the oven are thus favorable to the rapid evaporation of any water that may be in the cable, as the atmospheric pressure is very low, the temperature of the water and air is high, and the air is dry and is constantly being renewed.

The importance of the provision of the air inlet was not at first recognized, and a higher vacuum was then obtained, but it was found that, in the absence of air, heat was not readily conducted from the sides of the oven to the cable, and fresh layers of dry air were not brought into contact with the damp cable.

Occasionally cables are dried by the use of heat alone, but the operation takes longer, and is fraught with a certain amount of danger, as the paper is rendered brittle if overheated.

On account of the rapidity with which evaporation takes place at very low pressures, attempts have been made to apply a modification of the vacuum method to cables *in situ*. Of course it is not often possible to heat a cable throughout its whole length, but in one case it was possible to warm a considerable portion of a length and to admit warm, dry air in the inlet which was provided. Unfortunately there were other inlets which were not intentionally provided, and it is feared that while it is necessary to use cable-heads, pot-heads, etc., vacuum drying cannot be applied advantageously.

Up to the present the method generally adopted by the department has been to pump compressed air into the cables through a drying agent.

*Abstract from "The Post Office Electrical Engineer's Journal," London.

Improved Telephone System.

Mr. C. W. McKibben, superintendent of telegraph, Gulf Pipe Line Company, Beaumont, Tex., is the inventor of a telephone system, which he says has given excellent satisfaction for the past three years on a circuit nearly 500 miles long. He has been able to talk on a metallic circuit No. 8 iron wire for 400 miles with some ten to fifteen telephones across the line, the bells being of 2,000 ohms. This apparatus has been used satisfactorily on Bell telephone circuits, when the latter instruments would not work.

In Mr. McKibben's arrangement the receivers are cut out of circuit when the transmitter is in use, receivers of 1,400 ohms being used across the line. For this purpose he uses a little push button under the thumb. In talking, the button is pushed, and when receiving the pressure on the button is released.

A patent on this device was issued to Mr. McKibben September 26. The object of the invention is to provide an effective telephone set and circuits therefor for use in transmitting over a line of high impedance. In the operation of the invention he provides a system whereby both highly efficient transmitters and high power induction coils may be employed in conjunction with very sensitive receivers and yet without producing unpleasant effects in the ears of the person speaking into the instrument. To this end he provides for the interposition in the receiver branch of the circuit of an impedance device, and preferably disabling means for the impedance device, arranged in conjunction with means for potentiating the transmitting devices in such a way that when they are potentiated, the impedance device is likewise potentiated for operation; and vice versa.

Mr. McKibben states that he is using telegraphones embodying the same principle, and that they can out-talk and give better satisfaction than any instruments he has yet found. He uses standard apparatus, but arranged in a special manner. He claims to be able to operate his telegraphones on circuits that would have to be abandoned by the use of standard telegraphone equipment.

Modern Methods in Robbery.—The town of McComb, Okla., was raided recently by wise robbers. They first cut the telegraph and telephone wires, then blew open the safe in the town bank and got a large sum of money. The telegraph and telephone lines being cut an alarm could not be sent out so the robbers escaped.

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Odd Causes of Wire Trouble.

In our issue for September 16 we published an amusing story by Mr. R. H. Tudor, manager of the Western Union Telegraph office at Chattanooga, Tenn., about the grounding of a wire in which a farmer's mules and a wire fence were concerned.

Mr. E. F. Rowe, of the Union Pacific Railway Company, Laramie, Wyo., tells of a case that fell within his experience when he was wire chief for the Chicago, Burlington and Quincy Railroad.

"A branch wire was burned in two during an electrical storm," he says, "and a section hand very kindly made temporary repairs by splicing it with a length of barbed wire. Being unable to stretch the wire enough to clear the weeds, he placed a forked stick under the splice to hold the wire up. His temporary forked pole would not stand up to suit him so he guyed it to the fence with another piece of barbed wire tieing it to the splice and fence wire. It made a good ground as it had been raining several days. The lineman thanked him kindly for his assistance, but we could never understand why he thought the weeds would bother the wire and the fence wire would not."

Lengthening of Telegraph Signals.

Mr. Béla Gati, manager of the Royal Hungarian telegraph and telephone experiment station, Budapest, Hungary, describes in *Electrotechnik und Maschinenbau* some experiments which were carried out for the purpose of determining whether the lengthening out of telegraph signals which occurs with direct current on long lines and cables would take place with alternating current. By connecting together various long-distance lines forming a loop, it was possible to have the sending and receiving ends in the same office, and by means of an oscillograph connected to the two ends of the circuit the duration of signals at the sending and receiving instruments could be recorded. It was found that with alternating current the duration was the same, no lengthening out of the signal being apparent. He consequently concludes that rapid telegraphy in ocean cables is quite possible where the self induction does not exceed 0.01 henry.

Mr. Edison's Historic Platinum Electrodes.—An interesting story is told by Mr. W. H. Meadowcroft, is his book "The Boy's Life of Edison,' of how Mr. Thomas A. Edison came into possession of some battery materials during his early career, including three platinum electrodes which are still in service.

"Edison" says Mr. Meadowcroft," was ever keenly anxious to add to his stock of experimental apparatus, as an incident of this period shows: 'While working at Stratford Junction, Ont.,' Mr. Edison says, "I was told by one of the freight conductors that in the freight-house at Goodrich there were several boxes of old broken-up batteries. I went there and found over eighty cells of the well-known Grove nitric-acid battery. The operator there, who was also agent, when asked by me if I could have the electrodes of each cell, which were made of sheet platinum gave his permission readily, thinking they were of tin. I removed them all, and they amounted to several ounces in weight. Platinum even in those days was very expensive, costing several dollars an ounce, and I owned only three small strips. I was overjoyed at this acquisition, and those very strips and the reworked scrap are used to this day in my laboratory, over forty years later.'"

Secretary Stanton and the Telegraph.

In the address of Mr. David Homer Bates of New York, which was read at the unveiling of the statue of secretary of war Edwin M. Stanton, at Steubenville, Ohio, September 7, are given some interesting facts regarding the secretary's interest in the telegraph prior to and during the civil war.

"Edwin M. Stanton," he said, "became interested in the Morse telegraph as early as 1847, three years after the opening of the experimental line between Washington and Baltimore. The telegraph had crossed the Alleghanies in 1846, the first message out of Pittsburg having been sent on December 29 of that year, advising President Polk of the departure of Pennsylvania troops for General Taylor's army in Mexico. To carry the telegraph west, the Pittsburg, Cincinnati and Louisville Telegraph Company was formed in September, 1847, and in the list of directors appear the names of two residents of Steubenville, Ohio, Edwin M. Stanton and Joseph Means.

"The United States Military Telegraph Corps," he continued, "was a special organization, under the immediate direction of the secretary of war. During the civil war the executive mansion was not, as now, connected by telegraph, and all the president's telegrams were handled at the War Department.

"The history of the civil war was largely recorded by telegraph, which branch of the service Stanton called his right arm."

Mr. Bates dwelt at length upon secretary Stanton's character as a man and as an official, and refers to the incident following the announcement of the capture of Richmond and Petersburg, when William E. Kettles, the operator who received the message, was held out of the window by Stanton so the crowd could see "the operator who received the news of Richmond's fall."

What's in a Name?—Mr. P. V. DeGraw, fourth assistant postmaster-general, Washington, D. C., was recently shown a telegram in which his name appeared, not as he spells it, however, but as "it came" by wire. The initials suffered somewhat and the name, after filtering through the magnets and the receivers' brain, became "See 64 De Graw."

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INDUSTRIAL NEWS.

Western Electric Business.—Sales of the Western Electric Company for the ten months of the current year are about 3% ahead of last year, the foreign branch of the company's interest showing up somewhat better than domestic business. In the United States during October all sections except the Pacific Coast district showed decreases. The East has been the section of the country to show the greatest falling behind. Two more months of the company's year remain and it now seems fairly certain that the whole year's business will run very close to $66,000,000 which will make 1911 the second best year in the company's annals, being exceeded only by 1906, with sales of $69,000,000.

Improved Fuse Wire.

A bi-metal fuse wire was exhibited at the recent London electrical exhibition and attracted favorable comment. It is stated to be a noteworthy improvement in fuse wires. It consists in surrounding a small copper wire with a relatively large coating of alloy whose melting point is very much below that of copper. The wire will carry indefinitely 90 per cent. of its fusing current. Added to this sharpness of rating is the ability to carry six times the full-load current for short periods, as in starting motors. In addition to these qualities, the new wire has a property of "indicating" (by the melting of the outer alloy sheath) several seconds before "blowing"; furthermore, the use of a copper core makes the wire smaller and lighter for a given current rating, and thus, although higher in cost per pound, it is no more expensive per foot. This wire is called "Vanalium."

Current Gauge and Detector.—At the recent electrical exhibition in London was shown the Frisby mechanical electric current gauge and current detector. The first named resembles a pair of pliers; by closing it around a cable carrying a direct current and turning a knob the strength of current (in amperes) may be read on a scale. No cutting of the cable or removal of insulation is required. The current detector is based on a similar principle, but does not give a measure of the current strength in amperes. Instead, it shows the presence or absence of a current, and if a current is present the direction of flow may be determined. Among the American goods exhibited were Okonite and Manson insulating tapes, the Edison storage battery and the Edison business phonograph.

Manufacture of Electrical Apparatus, Etc.

A preliminary statement of the general results of the Thirteenth Census of establishments engaged in the manufacture of electrical machinery, apparatus and supplies has been issued by Director Durand of the Bureau of the Census, Department of Commerce and Labor, Washington, D. C. The manufacture includes dynamos and dynamotors, transformers, motors, storage and primary batteries, arc and incandescent lamps, searchlights, transmitters and receivers, rheostats and resistances, electric welding and therapeutic apparatus, electric switches, signals and attachments, and similar machinery, apparatus and supplies.

The general summary shows increases in all the items at the census of 1909 as compared with that for 1904. The number of establishments increased 29 per cent.; capital invested, 54 per cent.; the gross value of products, 57 per cent.; cost of materials, 62 per cent.; value added by manufacture, 52 per cent.; average number of wage earners employed during the year, 44 per cent.; amount paid for wages, 55 per cent.; number of salaried officials and clerks, 69 per cent.; amount paid in salaries, 82 per cent.; miscellaneous expenses, 32 per cent.; primary horsepower, 51 per cent.

There were 1,009 establishments engaged in this industry in 1909 and 784 in 1904, an increase of 29 per cent. The capital invested as reported in 1909 was $267,844,000, a gain of $93,778,000, or 54 per cent. over $174,066,000 in 1904. The average capital per establishment was approximately $265,000 in 1909 and $222,000 in 1904.

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 21, 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.

Great credit is due to president Mr. R. J. Marrin 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. J. P. Clolery was chairman of the entertainment committee and he performed his exacting duties in a most satisfactory manner. Mr. J. F. King was floor director, and was assisted by Messrs. F J. Sheridan and W. J. Gomber. 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.

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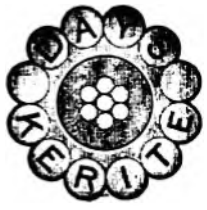

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The Railroad.

Removal of Headquarters.—The headquarters of Mr. F. T. Jennings, superintendent of the Canadian Pacific Railway Company's Telegraph, have been transferred from North Bay, Ont., to Sudbury, Ont.

Mr. C. J. Steinel has been appointed superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake City Railroad, Los Angeles, Cal., vice Isaac T. Dyer, deceased. Mr. Steinel was Mr. Dyer's chief clerk and has had over twenty years' experience in the railroad telegraph service and is therefore well qualified to fill the position.

More Telephones for the Chicago and North-Western.—The Chicago and Northwestern Railroad has recently placed with the Western Electric Company an order for apparatus to be used in extending its telephone system of train control. A total of twenty-eight Western Electric type selectors are to be placed along the West Iowa Division, extending from Boone to Council Bluffs, Iowa, a distance of approximately 150 miles. The dispatcher will be located at Boone. Mr. William Bennett is superintendent of telegraph of the Northwestern.

Telephone Dispatching on Central of Georgia.—The Central of Georgia is another of the large railroad systems in the South to equip its lines with telephones for train dispatching, and to this end has placed an order with the Western Electric Company for equipment, including complete line construction material. The line to be equipped extends from Columbus, Ga., to East Thomas Yard, Birmingham, Ala., and is 160 miles in length. There will be located thirty-one way stations and fourteen siding sets, in addition to several telephone sets in the chief dispatcher's office.

Meeting of Railway Telegraph Superintendents.

A joint meeting of the eastern and western divisions of the Association of Railway Telegraph Superintendents was held in the general office assembly room of the Chicago and Northwestern Railway, Chicago, November 23 and 24.

The first day's session was called to order by Mr. C. Selden, superintendent of telegraph, Baltimore and Ohio Railroad, Baltimore, Md., who was afterwards chosen permanent chairman of the joint meeting.

The election of officers resulted as follows: Western Division—Mr. E. A. Chenery, Missouri Pacific Railway, St. Louis, chairman; Mr. W. F. Bentley, secretary. Eastern Division—Mr. Charles Selden, Baltimore and Ohio, Baltimore, chairman; Mr. B. H. Anderson, secretary.

The retention in files of all telegrams as per order of the Interstate Commerce Commission was a subject given general discussion, but no definite plan was evolved whereby the files could be relieved of the burden. It was finally decided that any concerted action by the association should be held in abeyance, since it developed that the Western Union Telegraph Company has already taken the matter up with the Interstate Commerce Commission and that the final ruling in its case would undoubtedly cover and govern that of the railroads.

The handling of Western Union reports between railroad offices and the superintendents of telegraph, by railway mail, which practice has been objected to by the post office department was next taken up and the discussion of this subject occupied the remainder of the time of the first day's session.

Several legal opinions were submitted but the question presented so many points which might be differently construed, that the whole matter was finally dropped and left to the discretion of the individuals interested, until such time as the Postmaster-General took action, it being understood that a decision by him is now pending.

After lunch the members were guests of the Kellogg Switchboard and Supply Company and were taken to its plant in automobiles.

At the second day's session Mr. E. A. Chenery occupied the chair.

A voluminous amount of data was presented pertaining to the information requested regarding the cost of maintenance, rates of pay, statistics, etc., in train movement service, since the adoption of the telephone, but owing to the absence of any uniform system of compiling the information, and the fact that none of the members present appeared to be in position to present anything considered reliable, the whole question was referred to a special committee, appointed by the chair, consisting of Messrs. U. J. Fry, Milwaukee, Wis., chairman; W. W. Ryder, Chicago, and W. F. Williams, Portsmouth, Va.

This committee is to gather and compile such statistics as it is able to obtain and report at the next annual meeting.

After a vote of thanks for the courtesies extended by the Chicago and Northwestern Railway, the Kellogg Switchboard and Supply Company and the associate members, the meeting adjourned and proceeded in a body in a private car on the Burlington to the plant of the Western Electric Company, at Hawthorne, whose guests they were at luncheon.

The attendance was as follows: Active members—Wm. Bennett, Chicago and Northwestern, Chicago; C. W. Bradley, Chesapeake and Ohio, Richmond, Va.; W. J. Camp and wife, Canadian Pacific, Montreal, Can.; G. A. Cellar, Pennsylvania Lines west of Pittsburgh, Pittsburgh, Pa.; E. A. Chenery, Missouri Pacific, St. Louis, Mo.; J. P. Church, Wabash, Decatur, Ill.; M. H. Clapp, Northern Pacific, St. Paul, Minn.; W. P. Cline, Atlantic Coast Line, Wilmington, N. C.; W. L. Connelly, Chicago, Indiana and Southern, Gibson, Ind.; E. E. Dildine, Northern Pacific, St. Paul, Minn.; G. A. Dornberg, Pennsylvania Lines west of Pittsburgh, Pittsburgh, Pa.; P. W. Drew, Milwaukee, St. Paul and Sault Ste. Marie, Chicago;

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L. B. Foley, Lackawanna, New York; S. A. D. Forristall, Boston and Maine, Boston, Mass.; U. J. Fry, Chicago, Milwaukee and St. Paul, Milwaukee, Wis.; E. P. Griffith, Erie, New York; W. H. Hall, Missouri, Kansas & Texas, Dennison, Tex.; E. D. Hubbard, Grand Trunk, Battle Creek, Mich.; H. L. Husted, West Jersey and Seashore, Camden, N. J.; L. M. Jones, Atchison, Topeka and Santa Fe, Topeka, Kan.; E. C. Keenan, Lake Shore & Michigan Southern, Cleveland, Ohio; V. T. Kissinger, Chicago, Burlington & Quincy, Chicago; L. A. Lee, Pittsburgh & Lake Erie, Pittsburgh, Pa.; E. J. Little, Great Northern, St. Paul, Minn.; W. Marshall, Canadian Pacific, Toronto, Ont.; J. T. Nolan, Washington Terminal, Washington, D. C.; C. A. Parker, wife and son, Denver, Northwestern and Pacific, Denver, Col.; G. O. Perkins, Chicago Great Western, Chicago; C. B. Phelps, Louisville & Nashville, Louisville, Ky.; C. S. Rhodes, Cleveland, Cincinnati, Chicago & St. Louis, Indianapolis, Ind.; Thos. Rodger, Grand Trunk, Montreal, Can.; J. J. Ross, Michigan Central, Detroit, Mich.; W. W. Ryder, New York Central Lines, Chicago; C. Selden, Baltimore & Ohio, Baltimore, Md.; N. E. Smith, New York, New Haven & Hartford, New Haven, Conn.; F. S. Spafard, Chicago, Rock Island & Pacific, Chicago; A. B. Taylor, New York Central & Hudson River, New York; H. D. Teed. St. Louis & San Francisco, Springfield, Mo.; F. H. Van Etten, Chicago Southern, Chicago; H. A. Vaughan, Chicago, Burlington & Quincy, Lincoln, Neb.; J. M. Walker and wife, Denver & Rio Grande, Denver, Col.; W. C. Walstrum, Norfolk & Western, Roanoke, Va.; F. T. Wilbur, Illinois Central, Chicago; W. F. Williams, Seaboard Air Line, Portsmouth, Va.; G. Boyce, Chicago, St. Paul, Minneapolis & Omaha, St. Paul, Minn.; H. A. Tuttle Minneapolis, St. Paul & Sault Ste. Marie, Minneaplis, Minn.; B. Weeks, Illinois Central, Memphis, Tenn.; E. A. Patterson, Chicago, Milwaukee & St. Paul, Chicago.

Associate Members—E. V. Adams, J. H. Bell, American Telephone & Telegraph Company, J. H. Finley, Western Electric Company, Chicago; W. L. Cook and M. E. Launbranch, United States Electric Company, Chicago; A. B. Cowan, Western Union Telegraph Company, Chicago; A. F. Eyerman, American Bell Telephone Company, St. Louis; F. F. Fowle, Chicago; A. G. Francis, Chicago Telephone Company, Chicago; E. A. Hawkins, Western Electric Company; G. K. Heyer, Western Electric Company, New York; B. A. Kaiser, American Telephone and Telegraph Company, New York; J. M. Lorenz, Central Electric Company, Chicago; E. L. Marshall, National Carbon Company, Cleveland; H. E. Merrell, United States Electric Company, New York; L. H. Merrell, North Western Telephone Exchange, Minneapolis, Minn.; Val B. Mintun and W. O. Neville, Missouri & Kansas Telephone Company, Kansas City, Mo.; G. W. Peck, American Telephone and Telegraph Company, New York: C. S. Pflasterer, Oregon Short Line; A. D. Smith, Northern Electrical Manufacturing Company, Montreal, Can.; G. H. Groce, General Railway Signal Company, Rochester, N. Y.; R. N. Baker, American Telegraph and Telephone Company; E. C. Dodge, TELEGRAPH AND TELEPHONE AGE, New York; E. C. Hennis, Sandwich Electric Company; F. H. Reed, *Telephony*, Chicago; Lester Roth, Western Union Telegraph Company, Chicago; B. S. Stewart; G. M. Dodge, Dodge Institute, Valparaiso, Ind.

The Turner Monument Fund.

The contributions received up to date toward the Turner monument fund are as follows: Previously acknowledged, 1,706.99; A. B. Chandler, Brooklyn, N. Y., $10. Total, $1,716.99.

Mr. J. B. Taltavall, 253 Broadway, New York, is the treasurer of the fund, and all contributions are acknowledged in the columns of TELEGRAPH AND TELEPHONE AGE.

The monument which is to be located at Harriman (formerly Turner), N. Y., is now being cut under the supervision of Mr. Charles T. Ford, of Central Valley, N. Y., superintendent of the Harriman estate, and it is expected that the unveiling ceremonies will be held in December.

Our Subscription Contest.

Subscriptions under the contest rules are coming in rapidly and, apart from the immediate advantage derived, the results show what can be done with a little effort, and how wide the undeveloped field is.

The terms of the contest were given in our issue for September 1. Five prizes, amounting to $100, are offered those of our regularly appointed agents who send in the largest number of new subscriptions during September, October and November and up to December 21. The prizes are as follows: First, $50; second, $25; third, $15, and the fourth and fifth, $5 each. The contest is limited to new subscriptions and renewals only. The total amount of cash received from each agent on this account will decide the contest and in the event of a tie on any one prize, the prize will be divided.

Money must accompany all orders for subscriptions. 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.

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.

This is an excellent chance for agents to earn a substantial amount of money not only by capturing a prize, but also from the usual commissions earned from the subscriptions sent in.

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Obituary.

J. C. Fuller, the inventor of the Fuller bichromate battery, died in England recently. He was born in Bristol, in 1821.

George S. Duncan, aged 75 years, who carried messages with Mr. Andrew Carnegie in Pittsburg, Pa., died in Cuyahoga Falls, Ohio, on November 6.

Mrs. Harriet Pease Crapser, an operator for a Wall Street firm in New York, died in Brooklyn, on November 17. She was the daughter of Wilbur Pease, an old time telegrapher.

E. Monroe Cobb, of the Houston, Tex., office of the Western Union Telegraph Company, died at that place on November 15. He was in the service of the company for fifteen years, going to Houston from Atlanta, Ga., in 1900. He was a loyal and conscientious employe and generous and true to his fellowmen.

George Merrihew, aged 70 years, an old time telegrapher and a brother of Mr. James Merrihew, former superintendent of the Southern Division of the Western Union Telegraph Company, died in Philadelphia November 14. He was an attendant at the recent reunion of old time telegraphers at Atlantic City, N. J. He was identified with the telegraph in Philadelphia during his entire business career.

Georges D'Infreville, aged 65 years, a well-known electrician of New York, died in this city November 17. He entered the service of the Western Union Telegraph Company in 1872 and was for several years an electrical engineer of the company. Deceased was born in France and was prominent in telegraph circles until about 20 years ago, when he entered other business. He was an inventor of some note, one of his inventions being the wasteless battery zinc, which is so extensively used in gravity batteries. He was also the inventor of the duplex system of telegraphy bearing his name.

The Associated Press.

Mr. Paul Joyner has been appointed night chief operator of the Associated Press at Louisville, Ky.

The November issue of the "Service Bulletin of the Associated Press" contains an illustration of the new operating and editorial room of the Kansas City, Mo., "Star." The quarters are complete in their appointments, and the telegraph instruments are in close proximity to the editors.

Radio-Telegraphy.

International Wireless Conference.—The Bureau International de l'Union Telegraphique has announced that the next Radio-Telegraphic Conference will meet in London on June 4, 1912.

Wireless in Sweden.—A wireless coast station has been established at Gothenburg, Sweden, on the German system, for public service. It has a range by day of 1,200 km. (745 miles) and by night of 2,000 km. (1,240 miles). The tariff is 14 cents per word, and the lowest charge for a telegram is 1.40 fr. (28 cents).

Long Distance Wireless Transmission.—A wireless message was received at the Glace Bay, N. S., station of the Marconi Wireless Company, direct from Coltano, Italy, on November 19. This is the first message received direct from the new Italian station and it traversed a distance of about 4,000 miles.

Wireless at Massachusetts Institute of Technology.—A wireless station is being fitted up at the Massachusetts Institute of Technology, Boston, by the Wireless Society of that school. A 10-kw. transformer will be a part of a powerful sending station, by which the young engineers will be able to communicate with many other eastern colleges as well as regular stations. Prof. Harold Pender, of the department of electrical engineering, is aiding the society in the design of the station.

Wireless Messages from the Crippled "Olympic."—From the time when the steamer "Olympic" was run into a few months ago by the British cruiser "Hawke," until her arrival at Southampton, the Marconi wireless installation on board was constantly utilized for sending messages from the vessel to destinations in all parts of the world. Within about an hour nearly 150 messages were dispatched from passengers on the "Olympic." These messages passed through the wireless station at Niton, Isle of Wight.

Telegraph and Telephone Extension in Norway.—The Norwegian Storthing has voted appropriations for the extension of the telegraph system, for telephone construction and for wireless stations at Bergen and Hammerfest and on Spitzbergen.

"World Movers."—Mr. Andrew Carnegie gives a list of the names of twenty-one "world movers" which includes Dr. Alexander Graham Bell, Thomas A. Edison, Benjamin Franklin and Sir William Siemens, of Siemens and Halske, Berlin, Germany, He modestly omits his own name from the list.

Mr. Harman D. Jones, of the Western Union Telegraph Company, San Francisco, Cal., in renewing his subscription writes: "Thanks for anticipating my desire to renew subscription. It would be real deprivation to miss even one number and I hope my sense of appreciation may be gratified semi-monthly by this welcome visitor for as many years in the future as it has been in the past."

The standard quadruplex of the Western Union Telegraph Company was described by Mr. William Finn and illustrated in our issue for November 1, 1910, and in our issues for March 16 and April 1, this year, was printed the official illustrated description prepared in the office of the engineer of equipment. Copies of these issues may be obtained at the office of TELEGRAPH AND TELEPHONE AGE at 10 cents each.

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Understand What You Have to Do.

The following article by Mr. Theo. N. Vail president of the American Telephone and Telegraph Company and the Western Union Telegraph Company was published in a recent number of *Business Magazine.*

Understand what you have to do— and do it, is the principle that I might designate as the eleventh commandment in business. It is the keynote from which either harmony or chaos may come.

When a man understands a thing the consummation of it is half accomplished. For he goes forth with knowledge. Knowledge is power. He has studied all sides of the proposition, and is able to cope with and overcome difficulties as they present themeslves. He is rarely surprised. He knows what to expect either for or against him.

One of the prime factors in producing failure is this thing of being taken unawares with a point of procedure that was left to chance, and the understanding of it not thoroughly attained. Thus the other man who has studied the thing more fully has the advantage that you lack. There is not much in chance.

Occasionally a decision of chance brings the desired result. But it is precarious—unsafe. If there is a doubt in the business mind as to the understanding of a transaction, it were better, even at a loss, to get the information that will make the matter clear. If a man realizes and has understood conditions, even though he meets with reverses, it strengthens him for future action. He is not governed by self-reproach as to miscalculations.

Times without number we hear the complaint, "If I had only looked into it more closely." Often things look smooth and placid on the surface, and a hasty decision is made accordingly. And not until you have set sail do you realize the turbulent undercurrent which investigation might have disclosed.

It seems to me that there is the secret of success or failure—this thing of not only looking before one leaps, but looking thoroughly before so doing.

The man who is equipped with a sense of analysis and who can rightly measure the strength and weakness of the business at hand has the foremost faculty even in case of prospective defeat; he can most often, with a little effort, make it measure up to his deduction. For his understanding creates a sense of security that makes him invulnerable in withstanding the whims of disaster. Frequently an unheralded influence not reckoned with, a slight technicality overlooked—elements that should have been taken into consideration, —have been the cost of mistakes.

We do not despair of the mistakes made with seeing eyes, since we have gone into our project with full strength and willingness to abide by the consequences. But when we leave results to take care of themselves through laxity of understanding, they take care of themselves accordingly, and leave you to the greater care later.

It sums itself up, perhaps, in the "stop, look and listen" of the railroad crossing, which is the signal for going forward.

Thus the man who understands his work, and works understandingly, is he who creates the backbone of real endeavor.

The Continental Code in Wireless.—The question has been frequently asked whether it is necessary to know the Continental code in taking examinations for the position of wireless operator on ocean passenger steamers. On this point the regulations issued by the Bureau of Navigation, Department of Commerce and Labor, Washington, D. C., reads: "To secure a certificate an operator will pass an examination in the adjustment of apparatus, correction of faults, change from one wave length to another, transmission and sound reading at a speed of not less than fifteen words a minute American Morse, or twelve words Continental, as the operator may elect. Operators are advised to learn as soon as practicable the Continental system, recognized by the Berlin Convention and employed by the United States Navy."

From this it does not appear that a knowledge of the Continental code is necessary to pass an examination, but inasmuch as it is in extensive use any one qualifying as an operator should and is expected to familiarize himself with it as quickly as possible.

Radio-Telephone Promoter Arrested. — James Dunlop Smith, formerly president of the Radio Telephone Company, New York, was arrested on November 18, charged with having used the United States mails to defraud. The Radio Telephone Company was organized ostensibly to promote the use of wireless telephones, but, it is stated, almost its entire activity was devoted to the selling of stock. The complaint was brought by a woman in Camden, N. J., who was induced by Smith to buy Radio stock.

An Old Timer Retired.

Mr. Francis Ail McMullan, of Greenville, Ala., former manager of the Western Union office at that place, held the position continuously from November 1, 1868, until May 16, 1911, when he retired. Mr. McMullan was born in 1847 and entered the telegraph service in Greenville, January 1, 1862. During the Civil War he was railroad and military operator at various places in Alabama. At the close of the war he was employed by the Federal authorities as operator at Pollard, Ala.

Many subscribers find some one special article in TELEGRAPH AND TELEPHONE AGE alone worth more to them than the subscription price of the paper which is $2 per year.

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The Electrophone.—Mr. Walter P. Phillips, the well-known old time telegrapher and formerly general manager of the United Press, New York, has printed in pamphlet form his address delivered in Bridgeport, Conn., recently in describing the Electrophone. The pamphlet includes some added matter taken from Mr. Phillips' writings, and a page of portraits of Mr. P. B. Delany, Mr. Phillips and Mr. Thomas A. Edison.

T. M. B. A. Assessment.—Assessment No. 532 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Freeman P. Johnson at Clarkston, Ga.; William D. Sargent at Somerset, Pa.; John A. Kelly at New Orleans, La.; George W. Hughes at Wilmington, N. C.

Special Meeting of Serial Building Loan and Savings Institution.—A special meeting of the shareholders of the Serial Building Loan and Savings Institution will be held in the office of the association, at 195 Broadway, New York, at 5.15 o'clock p. m., December 20, for the purpose of considering and passing a complete revision of the by-laws, rendered necessary by the changes made in the New York State banking laws, under which the Serial Association is conducted. The new by-laws have received the approval of the superintendent of banks, and a copy of the same is being sent to the members by Secretary Edwin F. Howell.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, POSTAL.

District foreman J. R. Gorsuch was in New York recently on business connected with the service.

Mr. H. L. Bernstein has been transferred to the main office from the Bourse office.

Assistant wire chief F. P. McElroy has resumed his duties after an extended honeymoon through the west. Mr. and Mrs. McElroy were pleasantly surprised on their return to their new home by being presented with a handsome reclining chair, a gift of Mr. McElroy's office associates.

Mr. Lloyd E. Olmsted has been appointed printer attendant.

New arrivals: Messrs. Thomas Balkin, W. B. Ray, F. K. Holtzinger and J. L. Flynn.

PHILADELPHIA, WESTERN UNION.

The funeral of George Merrihew, who died in this city on November 13 and was buried on November 16, was attended by a large number of the fraternity of Philadelphia and New York including former general superintendent Mr. James Merrihew and Mrs. Merrihew, general superintendent A. G. Saylor and Mr. Elgin B. Saylor, of New York, and a delegation from Washington. Deceased was greatly beloved by all with whom he was associated and was always ready to extend a helping hand.

Mr. Harry V. Emanuel was sent to New Haven, Conn., to report the foot ball game between Princeton and Yale, as he is an expert at that kind of work as well as baseball.

CHICAGO, WESTERN UNION.

Mr. H. S. Worcester, of the Erie Railroad dispatcher's office at Huntington, Ind., was a recent visitor here.

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 $327,000, 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.

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New York City

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.

TRANSMITTING MACHINES

I am placing on the market improved YETMAN TRANSMITTING TYPEWRITERS, and KEYBOARD TRANSMITTERS without typewriting features. Am prepared to exchange, repair or rebuild all old machines. Write for catalogues and particulars to

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Telegraph and Telephone Age

No. 24. NEW YORK, DECEMBER 16, 1911. Twenty-ninth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Twice Told Tales.

In practical life one frequently encounters situations which apparently contradict the rules and laws given in the text books. This is naturally more or less perplexing., but in the end they are the best possible means of giving one a better understanding of the subject involved. The perplexity, however, is due to what is called a superficial education, that is to say a general knowledge of a subject but no thorough knowledge of any part of it. Were it not for these little difficulties these self-styled electricians would never discover how little they really know.

The trouble with too many of us is we are inclined to swallow a rule whole and either skip or ignore the qualifications entirely. The qualifications, after all, are what really give us the true inwardness of a rule or law, but it is not until we begin to put our superficial knowldege to practical test that we usually discover this fact.

For illustration, let us take the subject of ground wires. The unqualified rule states that if a conductor is grounded no current can pass at that point, yet owing to the manner in which the ground connection is sometimes made, some current often does get by, and that is the case when the ground wire possesses an appreciable amount of resistance.

An old lineman who had for years done good service removing crosses and grounds from external circuits, was called upon to assist in the wiring of a terminal switchboard in one of the large telegraph offices and while he had a fair knowledge of circuits, was greatly perplexed concerning the manner in which the one main line battery lead provided current for so many wires. After the connections were all made he remarked. "But what puzzles me is how the current gets by all those ground wires," referring to the lead running across the top of the board to which battery taps are connected to provide current for the various conductors, which, of course, terminate in a ground or grounded battery at the distant end. He knew from actual experience that when he was sent out to locate and remove a "ground" from a line conductor he could feel no current after he passed the fault, yet here was a wire clear across the board actually grounded in a hundred places by the wires it fed and current flowing right past each tap without the slightest interference.

The qualification of the rule concerning ground wires of which he was ignorant is, that although current cannot pass the point where the conductor comes in actual contact with a good "ground" or earth, it can and will flow beyond it if there is any appreciable resistance between the point where the conductor is tapped and the earth proper, such for instance, as when another wire falls across the conductor and one end of it lies on dry sandy, or other high resistance soil.

The reason is that current will flow into any side conductor that is grounded, provided the voltage at the point of contact has not fallen to zero, and it cannot reach zero until the earth itself is actually reached. The greater the resistance in the ground wire the greater the E.M.F. at the point of contact.

In the case of the feed or battery wire running across the top of the main line board, the conditions are different from a closed main line wire which may become dead grounded, but the principle is the same.

The E.M.F. which feeds this battery conductor is not allowed to drop in value when a grounded main line wire is connected to it, hence all such conductors get the benefit of practically its full value. This is brought about by leaving the distant terminal of the battery wire open. Under these conditions, the feed wire possesses an infinite resistance to current between the open end and the earth as nothing but the high resistance atmosphere completes the circuit.

The grounded main line conductors, although

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of high resistance, offer comparatively no resistance to that of the "open end" air conductor, hence the E.M.F. is practically of the same value throughout the entire length of the battery wire.

This demonstrates the importance of having good ground wires at way stations, especially on long railroad circuits. A high resistance ground wire will often permit sufficient current to pass to enable stations beyond to hear the signals although they cannot "break." Trouble of this kind creates what is called an "escape."

Another illustration of the benefit derived from hearing or reading a statement of facts differently worded may be shown as follows. "A" asks "B" what constitutes a line balance on a multiplex circuit?

"A" replies. A balance will have been obtained when the same current flows equally through both the main and the artificial lines. He then asks "C" the same question. "C" replies, a balance will have been obtained when the total amperage in the artificial line coil of the relay is identical with that in the main line coil.

Now both of these replies are correct provided the relay coils are evenly wound, or, more properly speaking, have the same number of convolutions of wire in the coils. But "A" took it for granted that that was understood. "C" however, gives answer that requires no qualification and at the same time brings out the real interpretation of a true balance, viz., the creation of identical value of magnetic energy in each coil.

The distinction noted between the two replies corrects, or rather, amplifies the first impression made by "A's" reply, and at the same time leads to other useful information which plays a large part in connection with the operation of balancing, viz.: the perfection or imperfection of the coil windings in relays.

These two illustrations should readily convince the reader that the twice-or-thrice-told story method of studying explains the rapid progress some scholars make. The latter are continually running right into valuable nuggets of information without even looking for them and by the time they actually reach the different subjects in their natural sequence they are half prepared for the lesson and grasp the details in almost one reading. In this way study becomes both easy and a pleasure.

Recent Telegraph and Telephone Patents.

ISSUED NOVEMBER 21.

1,009,134. Telephone Toll or Pay Station. To G. H. Davis, Worcester, Mass.

1,009,190. Telephone Trunking System. To C. A. Simpson, Chicago, Ill.

1,009,317. Detector for Wireless Signaling Apparatus. To M. B. Johnson, San Antonio, Tex.

1,009,689. Telephone Installation. To A. Pictet, Geneva, Switzerland.

ISSUED NOVEMBER 28.

1,009,762. Telephone System. To R. H. Manson, Elyria, Ohio.

1,009,813. Telephone System. To H. G. Webster, Chicago, Ill.

FINANCIAL.

Telegraph and Telephone Stock Quotations.

Following are the closing quotations of telegraph and telephone stocks on the New York Stock Exchange December 11:

Amer. Telep. and Teleg. Co.	139¼
Mackay Companies	81
" " pfd.	71½
Western Union Tel. Co.	78½

Cumberland Telephone Bond Issue.—The Cumberland Telephone & Telegraph Company will, on January 1, issue $15,000,000 in bonds in exchange for the minority stock of the company. The bonds will run 25 years.

Personal.

Mr. Thomas A. Edison visited Washington recently. He called at the White House where he met President Taft for the first time.

Mr. S. H. Flagler, manager of the telegraph department of the Standard Oil Company, 26 Broadway, New York, is confined to his home with typhoid fever.

Mr. Stephen E. Barton, a former telegrapher and now in the insurance business in Boston, was in New York recently on business and made personal calls on many of his old friends in the telegraph service.

Messrs. K. Y. A. Tong and K. C. G. Tong, sons of the director of the Imperial Chinese Telegraphs, arrived in New York recently on their way to China. They are attending school in England, and look more like Englishmen than they do Chinese.

Mr. E. H. Johnson, a former telegrapher and a well known pioneer in electric lighting made an address at the annual dinner of the Capt. John Ericsson Memorial Society of Swedish Engineers in New York, November 25. He told of the early days of electrical engineering and his business and personal relations with Mr. Thomas A. Edison.

Mr. V. L. Van Horne, of Auburn, N. Y., has been designated by the vice-president of the United States to succeed Mr. Charles Newsom as official telegrapher of the United States Senate, Washington, D. C. Mr. Newsom has resigned to enter the employ of the Western Union Telegraph Company at Indianapolis, Ind.

Mr. J. K. Butler, well known in telephone circles in New England and an old time telegrapher, has gone to spend the winter in Florida where he has an orange plantation. Mr. Butler has just rounded out fifty years of telegraph and telephone service. He is a well-known member of the profession being a constant attendant at Old Time Telegraphers conventions and was present at the recent Pioneer Telephone Convention in Boston.

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Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Minor M. Davis, electrical engineer of this company, has been appointed to be chief engineer of telephones of the company in addition to his present position. The position of chief engineer of telephones is a newly created one.

Mr. C. E. Bagley, district superintendent, Philadelphia, Pa., was a recent executive office visitor.

Mr. John B. Whittaker has been appointed manager of the Cumberland, Md., office, vice W. G. Morris, resigned. Mr. Whittaker was for several years connected with the telegraph department of the Cumberland and Pennsylvania Railroad.

The office at Fifth Avenue and Forty-second Street, New York, which was recently destroyed by fire, has been reestablished. It is fittted up in a very attractive manner and is modern throughout.

An evening class for the teaching of telegraphy to messengers has been established in the messenger department at headquarters at New York. Five operating tables with up-to-date equipment have been provided for the purpose and a competent teacher employed.

This company has fitted up a handsome and modern office at Holyoke, Mass.

This company has secured a new location for its Newark, N. J., office in the Union Building, a new and modern fireproof structure on Clinton Street, just off Broad. Handsome quarters will be fittted up and every convenience and improvement provided. The main office will be on the ground floor, and in the basement there will be shower baths, uniform room, etc., for the messengers. The old quarters at the corner of Broad and Market Streets have been inadequate for the company's needs for some time, and they will be given up reluctantly as the company has been located in the same building for many years. The new quarters, however, will be far superior in every way and are in the heart of the Newark financial district. Mr. John F. Coogan is the manager.

Joint Use of Poles.—Judge Dayton in the United States circuit court for the Northern district of West Virginia, has authorized the receivers of the National Telephone Corporation to enter into a contract with the Postal Telegraph-Cable Company for the joint use of poles and wires.

Minor M. Davis Appointed Chief Engineer of Telephones, Postal Telegraph-Cable Company.

Mr. Minor M. Davis, electrical engineer and chief engineer of telephones, Postal Telegraph-Cable Company, New York, was born at North Chatham, Mass., and attended school on the Island of Nantucket until he was 14 years of age. His first telegraph work was as a messenger in the Western Union Telegraph office in Nebraska City, Neb. After a year in that office, during which time he learned to operate, he went to Washington, D. C., where he soon found employment in a branch office of the Atlantic and Pacific Telegraph Company, in the Washington Hotel. After working in several other branch offices, he finally got a position as operator on the night force at the main office. The wires were leaky and very hard to work in wet weather, and continuous duty until the day force came around was not unusual. There was no extra. When young Davis took the position he was pleasantly but firmly told by the night manager that his hours would be "from five p. m. until h— freezes over, if necessary."

Mr. Davis worked for the Atlantic and Pacific, Western Union, Automatic, and Philadelphia and

MINOR M. DAVIS,
Electrical Engineer and Chief Engineer of Telephones, Postal Telegraph-Cable Company, New York.

Reading companies in Washington, Baltimore and Philadelphia. In 1878 he came to New York to be a substitute at the Western Union main office for another operator who had three months' leave of absence. When Mr. Davis left the Western Union service he was a traffic chief, giving much of his time to the study of the switchboard and the quadruplex and duplex. In 1883 he joined Mr. William Maver in writing "The Quadruplex;" a book still much used. In 1884 Mr. Davis was employed as assistant to electrician F. W. Jones of the Bankers' and Merchants' Telegraph Company. When the Postal Telegraph-Cable Company absorbed the Bankers' and Merchants', Mr. Davis, was retained in the electrical department, where he remained until January, 1898, when he became traffic manager of the Postal Company. He organized the traffic de-

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partment and remained at its head until June, 1907, when he became electrical engineer of the company.

During his long service in the engineering department of the Postal Telegraph-Cable Company, Mr. Davis has given much attention to the use of telephones for local and long distance purposes.

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, was the guest of honor at a luncheon given in San Francisco, Cal., recently by Mr. Henry T. Scott, president of the Pacific Telephone & Telegraph Company.

Mr. Belvidere Brooks, general manager, has issued a general order on the subject of office economies in the smaller things. Among them he enumerates discontinuance of unnecessary reports, records, etc., elimination of formality in much of the official correspondence; reduction of postage expense by consolidation of mail matter; reduction of electric light and gas bills; saving of drinking water, etc.

Mr. Thomas W. Carroll, assistant to the general manager, is in the South on a trip of inspection.

The office of Mr. W. N. Fashbaugh, traffic engineer, New York, has been removed from the fifth to the second floor.

Wm. Pitt Phelps, aged 70 years, who was identified with the electrical engineers' office of this company, died at his home in Merchantville, N. J., November 28. He was a brother of the late George M. Phelps, inventor of the printing telegraph and stock ticker, known under his name. Deceased was also an inventor of stock tickers.

Mr. C. H. Murphy, general superintendent of time service, New York, has returned from an extensive trip throughout the South, including Texas, in the interest of the time service which under his management has been developed to very large proportions during the past few years.

Mr. A. Woodle, district commercial manager, Syracuse, N. Y., has been transferred to the office of the general superintendent at New York for special service.

Mr. D. C. Dawson, district traffic superintendent, St. John, N. B., has gone to the Pacific Coast where he will spend three or four months resting. Mr. Dawson has not had a vacation for forty years.

Mr. H. J. Kinnucan, district commercial superintendent, Detroit, Mich., was in New York recently on company business.

Mr. C. E. Davidson, who was recently appointed manager at Montgomery, Ala., was formerly manager at Brunswick, Ga., and Jacksonville, Fla. He was succeeded at Brunswick by Mr. W. P. Rivers, Jr., formerly of the Savannah, Ga., office.

Mr. E. C. Newton, manager at Little Rock, Ark., has been appointed special agent at that point.

Mr. H. L. Arnold, manager at Hot Springs, Ark., has been promoted to the management of the Little Rock, Ark., office.

Mr. B. H. Arter of St. Louis, Mo., has been appointed manager of the Texarkana, Tex., office of this company. He succeeds Mr. Ensign M. Haldeman, who has been promoted to the managership of the Hot Springs, Ark., office.

Mr. C. W. Chevault, manager of the Johnson City, Tenn., office has been promoted to the management of the Ashland, Ky., office.

Mr. B. F. Lally, of the Dallas, Tex., office, has been advanced to the position of chief operator of the Ft. Worth office.

Mr. D. V. Ferris, chief operator of the Syracuse, N. Y., office spent Thanksgiving with relatives in New York. Mr. Ferris has held his present position for forty-five years.

The Cable.

New Cable to Egypt.—The Eastern Telegraph Company has decided to lay an additional submarine cable between Gibraltar and Egypt, touching at Malta, to cost about $2,000,000.

Bonuses and Profit-Sharing.—The Eastern Telegraph Company and associated companies in celebrating the coronation of King George granted a bonus of one month's pay to every employe of the staff ashore and on board ship who had been in the service for one year prior to May 31, 1911. At the recent annual meeting of the company the chairman referred to the spirit of good feeling existing between the company and its employes, and in granting the additional benefit of the bonus it was the desire that the employes might share in the prosperity of the company. It was suggested that a profit-sharing or co-operative plan might be adopted whereby employes of the company might participate in the profits.

The Telephone.

Mr. Alonzo Burt, vice president and treasurer of the Chicago Telephone Company, has been elected a director of the company succeeding Mr. A. S. Hibbard, now of New York, resigned.

Telephone from Puget Sound Cities to New York.—Mr. Theo. N. Vail, president of the American Telephone & Telegraph Company, while in Tacoma, Wash., recently stated that Puget Sound cities will in another year be able to talk to Chicago and New York.

Reducing Telephone Rates in New York.—The new telephone tolls between Manhattan and Brooklyn boroughs, New York City, went into effect December 1. The rates which were formerly ten cents are now five, and the fifteen cent tolls are now ten cents.

Chinese Prefer Automatic Telephones.—Chinese telephone subscribers prefer automatic tele-

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phones because of the difficulty they have in calling numbers over the manually-operated switchboards. They are provided with special calling dials having both the ordinary figures and their Chinese equivalents, and a directory printed in Chinese has been provided for them.

Telephone and Telegraph Society of New England.—The regular meeting of the Boston Plant Chapter of the Telephone and Telegraph Society of New England, was held in Boston December 12. Captain Wm. Brophy addressed the meeting on high tension circuits, their characteristics and hazard, and Dr. George B. Magrath described the effect of a current of electricity on the human body.

Radio-Telegraphy.

New Wireless Magazine.—"Wireless News" is the name of a new magazine published monthly in New York by the Wireless News and Advertising Company. It is devoted to wireless telegraphy and wireless as applied to aeronautics.

To Reorganize United Wireless.—A meeting of stockholders of the United Wireless Telegraph Company, New York, is called for the purpose of reorganizing the affairs of the company and taking it out of the receiver's control.

Detecting Thunderstorms by Wireless.—A wireless telegraph equipment is used in a Spanish observatory to detect thunderstorms, local and distant, wireless apparatus being affected by the electro-magnetic waves which accompany a lightning discharge.

Wireless in the Philippines.—Owing to the existence of coral reefs in the waters surrounding the Philippine Islands it has been difficult to maintain telegraph cables. Wireless has replaced these cables in many instances and has practically solved the question of insular communication.

Wireless Interconnection of Colleges.—A movement has been started toward connecting the more important universities and colleges of the country by wireless telegraph. When the distance between colleges is too great for direct communication, messages will be relayed from one or more intermediate college stations.

Wireless Telegraph in Chile.—The Chilean government has accepted the Marconi company's bid to install wireless stations at Arica, Antofagasta, Coquimbo, Puerto Montt, or Valdivia, and Punta Arenas at a cost of $311,786, United States gold, to be completed within fifteen months. These, with the stations at Valparaiso and Talcahuano, will make a circuit from Arica to Punta Arenas, a distance of over 2,000 miles.

Two Wireless Operators for Each Steamer.—Mr. William J. Bryan suggests legislation requiring the assignment of two wireless operators to each steamer at sea. He was a passenger on the steamer Prinz Joachim which went ashore recently in the West Indies and the wireless call for help sent out from the disabled steamer received no response from other steamers for several hours, because, as Mr. Bryan claims, ships carry but one operator and the operators were not on duty at the time.

Wireless in Sweden.—The wireless telegraph station at Nya Varfvet, a suburb of Gothenburg, Sweden, formerly used only for naval and military purposes, has been opened for commercial business by the Swedish Royal Telegraph Department. The system used is Telefunken. The wave length in meters for receiving is 600 and for sending 1,000—1,500. The primary power is about 50 horsepower. The radius of action in the daytime is 750 miles and at night 1,250 miles. The Morse code is used, but there is no special ruling to confine the station to that code. The toll for messages from ships is $0.0268 per word, with a minimum of $0.268 per message. This is, of course, exclusive of the ship's charges. It includes delivery in the city of Gothenburg. Messages to other points in Sweden are subject, in addition, to the usual inland charge of 0.0134 per word. A charge is always made for the address and signature.

Obituary.

George H. Stapley, aged 55, of Chicago, for many years in the brokerage business and a partner of the Odell Commission Company, died in Chicago, Ill., December 2.

Colonel E. A. Hawkins, aged 68 years, a veteran telegrapher, died at Upper Sandusky, Ohio, on December 5. He was a member of the United States Military Telegraph Corps during the Civil War.

Frank W. Ross, aged 19 years, a telegrapher at Colliers, W. Va., died at that place recently. He weighed 425 pounds and measured sixty-four inches around the waist. A casket was specially constructed to contain the remains, which were buried in Port Washington, Ohio.

Willis Derwin Chandler, aged 30 years, son of Colonel Albert B. Chandler, chairman of the Board of Directors, Postal Telegraph-Cable Company, New York, died at Pinehurst, N. C. December 11 after a lingering illness. Interment took place at Randolph, Vt., December 15.

John Henry Stevenson, aged 50 years, for the past twenty years in the service of the American Telephone and Telegraph Company, New York, died at his home in Brooklyn, November 23. Mr. Stevenson was a graduate of Yale and was very popular among his office associates and telephone people generally. He was a brother of Mr. F. A. Stevenson, general superintendent of plant for the same company at New York.

Early Struggles of the Telegraph and Telephone.—The New York *Tribune* of November 29 printed an interesting article headed "Telegraph's Story Full of Romance." It told of Professor Morse's struggles in establishing the telegraph and the skepticism and ridicule with which the telephone was received. The Atlantic cable and wireless telegraphy also receive brief mention.

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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.

Following is President Vail's announcement of the institution of the new service:

"These cable letters, weekend cable letters and deferred press messages are not offered as a substitute for prsent cable service, but are intended to place the Atlantic cables within reach of the public at rates which will encourage their use for social and business communications which are now subject to the delay of over-sea mails, and which are of sufficient importance to justify a moderate charge for the use of the cable while not of such pressing urgency as to warrant the cost of an expedited cable service.

"Cable letters and weekend letters may be filed in any city or town at any open office of the Western Union, the Anglo-American and the Direct United States Cable companies to be forwarded to the cable terminus at New York, Boston or Montreal by mail or telegraph at the option of the sender, whence they will be cabled at the convenience of the company to reach London or Liverpool in time for delivery on the morning of the second day following their receipt at New York, Boston or Montreal. Weekend letters may be filed as above up to midnight Saturday, whence they will be cabled at the convenience of the company for delivery the following Tuesday morning. Telegraphic transmission of both classes of cable letters between the places of origin and New York, Boston or Montreal, will be charged for, the sender designating the class of service to be used. Postage from the originating point to New York, Boston or Montreal and postage to any European point are included in the tariff.

"Cable letters and weekend letters from the United States destined for the cities of London or Liverpool will be delivered through the mails unless the sender arranges for telegraphic or messenger delivery and those destined for points beyond London or Liverpool will be forwarded by mail, or the company, acting as agents for the senders, will forward such cable letters by telegraph upon the payment of the regular telegraphic toll, until such time as special tariffs are arranged for with the British and other governments.

"Cable letters and weekend letters will be received at any British office of the Western Union, Anglo-American and the Direct United States Cable companies and will be transmitted by mail or telegraph, as provided above, to the cable terminus at London, whence they will be cabled to reach New York, Boston or Montreal on the second day following the receipt at London. Travellers abroad can arrange with any of the above cable companies to forward cable letters received by mail or telegraph to destination in the United States. For telegraph transmission between the points of origin and London, the regular telegraphic tolls will be charged, until such time as special tariffs are arranged with the British and other governments.

"Cable letters and weekend letters from Europe destined to New York, Boston or Montreal will be delivered through the mail unless arranged for telegraphic or messenger delivery. For telegraphic transmission from New York, Boston or Montreal to points of destination in the United States an additional charge at special night letter rates will be made.

"Since the tariff for cable letters and weekend letters is based upon the use of English words without the use of code words, no code words will be accepted for transmission other than registered code addresses. In accordance with the established practice, the address and signature will be counted and charged for.

"The tariff covering transatlantic cable transmissions and postage for mail delivery only will be: For cable letters, $1.50 for 20 words, with 30c. added for each additional five words; for weekend letters, $1.50 for 30 words, with 25c. added for each additional five words. The rate for deferred press messages is 5c. per word."

The first cable letter was sent by Mr. Frank H. Hitchcock, postmaster-general of the United States, from Washington to the British postmaster-general, London, at 12:21 a. m., December 6. It read as follows:

"Availing myself of opportunity to send first cable letter transmitted from this side, I convey to you from American postal service our greetings and best wishes."

There were thirty-five words in the message. In this connection it is interesting to note that the first paid public message sent across the Atlantic by cable was transmitted on July 27, 1866. It was from W. J. S. Donnelly at Heart's Content, N. F., to Wm. Tarbet, Liverpool, Eng., and consisted of twenty words for which $100 was paid. Under the new cable letter arrangement the same number of words can be sent for $1.50. Mr. Donnelly, the author of this message is still living in Havre de Grace, N. F.

Mr. George G. Ward, vice-president and general manager of the Commercial Cable Company, being asked in regard to the cuts in cable rates announced by the Western Union Telegraph Company, said:

"There are four reductions involved, as follows:

"(1) A week-end letter, to be received Saturday and delivered the following Tuesday. This will involve Sunday work. We prefer to give our cable operators a rest on Sunday. We confine our Sunday business to public necessity, like Sunday railroad trains. We shall not adopt it. There is no demand for a service of this kind.

"(2) A newspaper rate of five cents a word. This is a heavy cut of fifty per cent. The purpose is obvious. We think the spectre at Wash-

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ington is responsible for it. We shall make the same cut.

"(3) A deferred cable letter. This is to be delivered two days after it is handed in. We shall not adopt it, so long as it remains deferred. Ours is not a deferred company. Ninety-nine per cent. of cablegrams call for immediate delivery. Here, too, there is no public demand for such service.

"(4) Plain language cablegrams at half rates. This is not a Western Union move. It was proposed by the Postmaster-General of Great Britain over two years ago. He communicated with the Commercial Cable Company in regard to it at that time. We shall adopt it in accordance with our understanding with the Postmaster-General of Great Britain, entered into long ago. That was before the Bell Telephone Company acquired the Western Union Telegraph Company. The Western Union now seeks to give the impression that it originated this plain word cablegram at half rates. The fact that it is not to go into effect until January 1, while the other reductions go into effect at once, shows who originated it."

A dispatch from London, December 5, says the negotiations which have been proceeding between the Postmaster-General and the cable companies in regard to reduced rates for deferred dispatches have been completed satisfactorily. Press messages to the United States, Canada and Australia, subject to delay, will be accepted at half the present rates, beginning December 15. Ordinary messages in plain language will also be accepted at half price, beginning January 1 on the same conditions. In the United Kingdom the Post Office authorities intend to introduce a cheap night system of telegrams at thirty-six words for sixpence (twelve cents.)

Lord Strathcona, Canadian High Commissioner in London, in a despatch to Ottawa, Ont., says that the Anglo-American and Direct United States Cable companies controlled by the Western Union will also carry the deferred non-urgent press messages at half the present rates. The deferment in favor of urgent messages is estimated at nineteen hours. The British Postmaster-General, he also stated, has obtained the consent of the Pacific Cable Board and of the Australian Government to a similar reduction of their charges for press messages of this class. The tariff of the New Zealand Government is already very low, and a further diminution is not asked. It is also announced that negotiations which have been proceeding for some time with the cable companies for reducing by one-half the rates for plain language non-urgent cablegrams between the United Kingdom, India, the Dominions, the crown colonies, and the United States have proved successful and the new arrangements will take effect on January 1 next. The concurrence of certain foreign administrations will soon be obtained and that scheme will be extended to many other parts of the world.

Telephone Pioneers of America.

A. A. OWENS, VANCOUVER, B. C.

Mr. Archibald Alexander Owens, general inside wireman and installer, Bell Telephone Company, Vancouver, B. C., began his telephone service in Montreal in February, 1889, and is enrolled as one of the Telephone Pioneers of America. He started as a ground man and has worked his way

ARCHIBALD ALEXANDER OWENS,
Vancouver, B. C.

through the positions of lineman, troubleman, inspector, wireman and building wireman and inspector. He afterwards entered the head office of the electrical-mechanical department and was engaged in special service, later becoming switchboard inspector, private branch exchange installer, night man in charge of the switchboard and finally general inside wireman and installer, which position he now occupies.

Charging for Date, etc., on Telegrams. — The Western Union Telegraph Company has petitioned the Public Service Commission, second district, New York, for a rehearing upon the order recently made by the Commission, directing that company to discontinue its practice of charging the Postal Telegraph-Cable Company for certain words inserted on telegrams received from the Postal for further transmission over the lines of the Western Union Company. The Western Union company will ask for a modification of the order made, so that it will be allowed to charge for the name of the place and the State where the message originated, and the word "via," so that three words will be charged for instead of the number of words charged for at present, which is, according to circumstances, four or five.

Threatened Strike. — According to newspaper reports the postal employes of Great Britain contemplate striking about the holiday season.

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The First Telephone Exchange.

It was in the year 1877 that Professor Bell was experimenting in Charles Williams' shop at 109 Court Street, Boston. This shop had for nineteen years previous to that date, been manufacturing all the electrical appliances for the Holmes Burglar Alarm Company; in fact, it might have been called a Holmes shop because more than half the work of the shop was for the Holmes Company.

The subject of this sketch, Mr. Edwin T. Holmes, who was carrying on the burglar alarm business in the City of Boston, was of course a frequent visitor to this shop, and one afternoon he found Mr. Williams shouting into a box with a mouthpiece on one end.

"What have you got in that box, Williams?" said Mr. Holmes. Laughingly he replied, "This

E. T. HOLMES.
President Holmes Electric Protective Company, New York.

is what someone calls a telephone and I have got one on each end of my private wire to my home in Somerville, and I am trying to call Mrs. Williams."

This was Mr. Holmes' first introduction to a telephone. From that time he watched developments and in April, 1877, told Mr. Gardiner G. Hubbard that if he ever got two or three of those things so they would work that he would like to show them to Boston. Mr. Hubbard inquired how he would show them, whereupon Mr. Holmes thoroughly explained his burglar alarm protective system to him, stating that he had individual wires running from the various banks and many business houses to his central office for the purpose of protection against burglary; that by pressing a knob he could ring a bell in a bank and the bank could, in return, send a signal into his central office. Mr. Holmes explained how he could construct a switchboard that would throw the circuit from his burglar alarm apparatus on to a telephone when receiving a signal from a bank, or the bank could, by moving a switch, throw in the telephone at their end upon receiving a stated signal from the central office. He said, "I can do even more; I can, upon receiving a signal from one bank, press a knob and signal a second bank and put the two in communication with each other."

This so pleased Mr. Hubbard that he slapped Mr. Holmes across the back and said, "I'll do it—get the necessary appliances ready," and this was the reason that the small switchboard exhibited at the late organization meeting of the Telephone Pioneers of America was constructed, and it was through this switchboard that Mr. Holmes exhibited the telephone to the citizens of Boston for a couple of weeks, using telephone Nos. 6 and 7 in that exhibit.

He was next anxious to do business; there was no company formed, but Mr. Hubbard told him that if he would furnish the money to build the exchange he would rent him the telephones at $10 per year each, whereupon Mr. Holmes immediately began to solicit subscribers for the first telephone exchange, under the name of the Telephone Despatch Company, which was established in a loft he hired above the one he was occupying for his own business, at 342 Washington Street, Boston.

Some time later the first telephone exchange in New York was started in the Holmes Burglar Alarm Company's office at 518 Broadway, a building that is still occupied by the Holmes Company, and Mr. Edwin Holmes, the father of the subject of this sketch, was the first president of the New York Company.

Mr. Holmes also has the distinction of having hired the first girl who ever operated a telephone, and the wisdom of this step has been fully borne out by experience, since there are thousands of young ladies now in the service. Mr. Nat Lilly of the New England Company, in Boston, was one of Mr. Holmes' first operators and Mr. J. J. Carty, now chief engineer of the American Telephone and Telegraph Company, New York, also entered the telephone service in this first exchange at 342 Washington Street, Boston. Mr. Holmes later sold his telephone business to the New England Telephone Company when it was formed.

Mr. Holmes is now president of the Holmes Electric Protective Company in New York City.

Wireless in the Antarctic.—The Antarctic exploration steamer "Deutschland," which recently sailed from Buenos Ayres, Argentine Republic, is equipped with a wireless outfit having a range of about 600 miles. It is thought that the steamer will never be out of the range of the wireless station at Tierra del Fuego for the receipt of signals.

Every telegrapher should study the Lessons on Technical Telegraphy now running in TELEGRAPH AND TELEPHONE AGE. Subscription price, $2.00 per year.

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Western Union Cable Steamer "Robert C. Clowry."

The Western Union Telegraph Company has about 150 submarine telegraph cables under the rivers, bays and creeks of New York harbor at sixty different crossings. The length of these cables varies from 500 feet to thirteen miles, the latter being the cable between the Battery and Coney Island.

With so many links exposed to the ravages of ship anchors, and other damaging influences, such as chafing on rocks, etc., it can readily be understood how a cable steamer may be kept busy making repairs.

The cable steamer "Western Union" which has been laying and repairing cables for the Western Union Company for the past 35 or 40 years has in late years been taxed beyond her capacity owing to the growing weights in cables and a widening radius of service. The new cable steamer "Robert C. Clowry," illustrated herewith, was built along modern lines and intended for the heavier work now demanded of a boat of this class. She is used for the laying, recovering and repairing of telegraph deep-sea and harbor cables. The boat is 150 feet long and 32 feet wide, and when fully loaded draws 11 feet 6 inches of water. She has two keels and two rudders and is propelled by two screws, each driven by a 500-hp. compound engine.

FIG. 1.—WESTERN UNION CABLE STEAMER "ROBERT C. CLOWRY."

The cable reel is located on the main deck forward of the pilot house, and below deck is a cable tank eighteen feet in diameter and twelve feet high, having a capacity of about seventy miles of one-inch deep-sea cable.

Two horizontal drums, five feet six inches in diameter, are mounted on the port and starboard sides of the cable tank, with the driving engine and connecting gear placed between. This machinery is capable of lifting a deep-sea type of cable from a depth of one mile.

At the bow of the ship a strong iron frame is fixed so as to extend beyond the bow and on this frame are mounted two large sheaves to accommodate the cable leading to the port or starboard drum. Near the bow is a capstan driven by worm gear, slow speed, capable of lifting twenty tons. This can be used for lifting anchors or driving another gear when necessary. Forward of the deep-sea machinery is a large vertical reel which is run by an independent engine. Ten miles of deep-sea type of cable can be coiled on this reel and a proportionately smaller amount of the heavier types, such as the harbor multiple type of cables.

Attached to the lattice iron mast is a large boom of the same construction. This boom can be swung around to any required angle, so that it can be used for hoisting weights up to twenty-five tons or underrunning cables. Heavy types of

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cable when coiled on the reel are paid out by means of this boom.

The ship was designed for river and harbor and along shore work in moderate depths. Since being put in commission she has made several repairs in quick time between New York and Nova Scotia in depths varying from about 100 fathoms in the vicinity of Sable Island to 750 fathoms southeast of Montauk Point, Long Island. The repairs at the latter place were made at the greatest depth in which this steamer has so far operated. Apart from the deep-sea work she has done considerable telephone and telegraph heavy cable work in various localities.

The deep-sea part of the work is by far the most interesting, everything connected with such operations requiring close calculation. The locating of trouble requires experts in electrical testing in ocean work. Skill in navigation where it is necessary to put the ship right on the line of the cable in any part of the ocean and close to the position where the fault was located is of course very essential. The jointing of the gutta-percha core in making a repair can only be done by those accustomed to the work.

The electrical testing room is an interesting feature of the boat. A modern deflecting, Sullivan type, galvanometer is used, with Wheatstone bridge, condensers and keys for bridge capacity tests, and instruments for Morse and mirror working. On several occasions communication has been held from the ship when off Nova Scotia, with Penzance, England, a distance of over 2500 nautical miles.

The "Robert C. Clowry" is manned by a crew of thirty-six persons, the officers being: Capt. Theo. Royen, master; H. Schmidt, chief officer; H. Baker, chief engineer; R. Gundry, first assistant engineer; David Lynch, division cable electrician and Alexander Kline, general cable foreman. Capt. Royen also has supervision and direction over the "Western Union," which is commanded by Capt. G. G. Olmstead, while that steamer is making repairs in New York harbor and immediate vicinity.

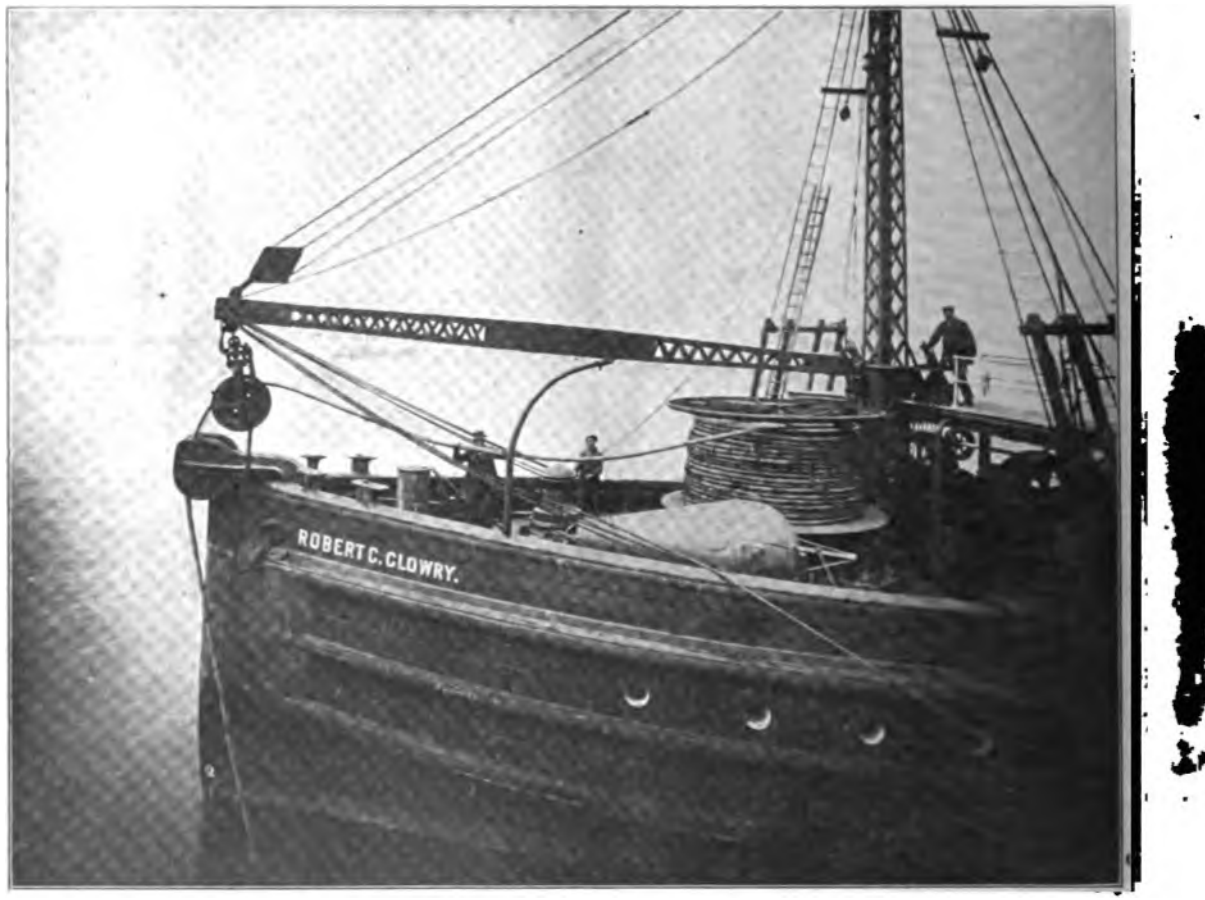

FIG. 2.—BOW OF CABLE STEAMER SHOWING THE CABLE REEL.

Joy Riders and Poles.—Joy riders are often charged with recklessness in colliding with telegraph and telephone poles, but when it is remembered that there are 32,000,000 poles in the country, it is surprising that they hit so few. It is not an easy task to dodge 32,000,000 poles.

Paris to Morocco by Wireless.—Wireless communication was held recently between the Eiffel tower in Paris and Fez, Morocco.

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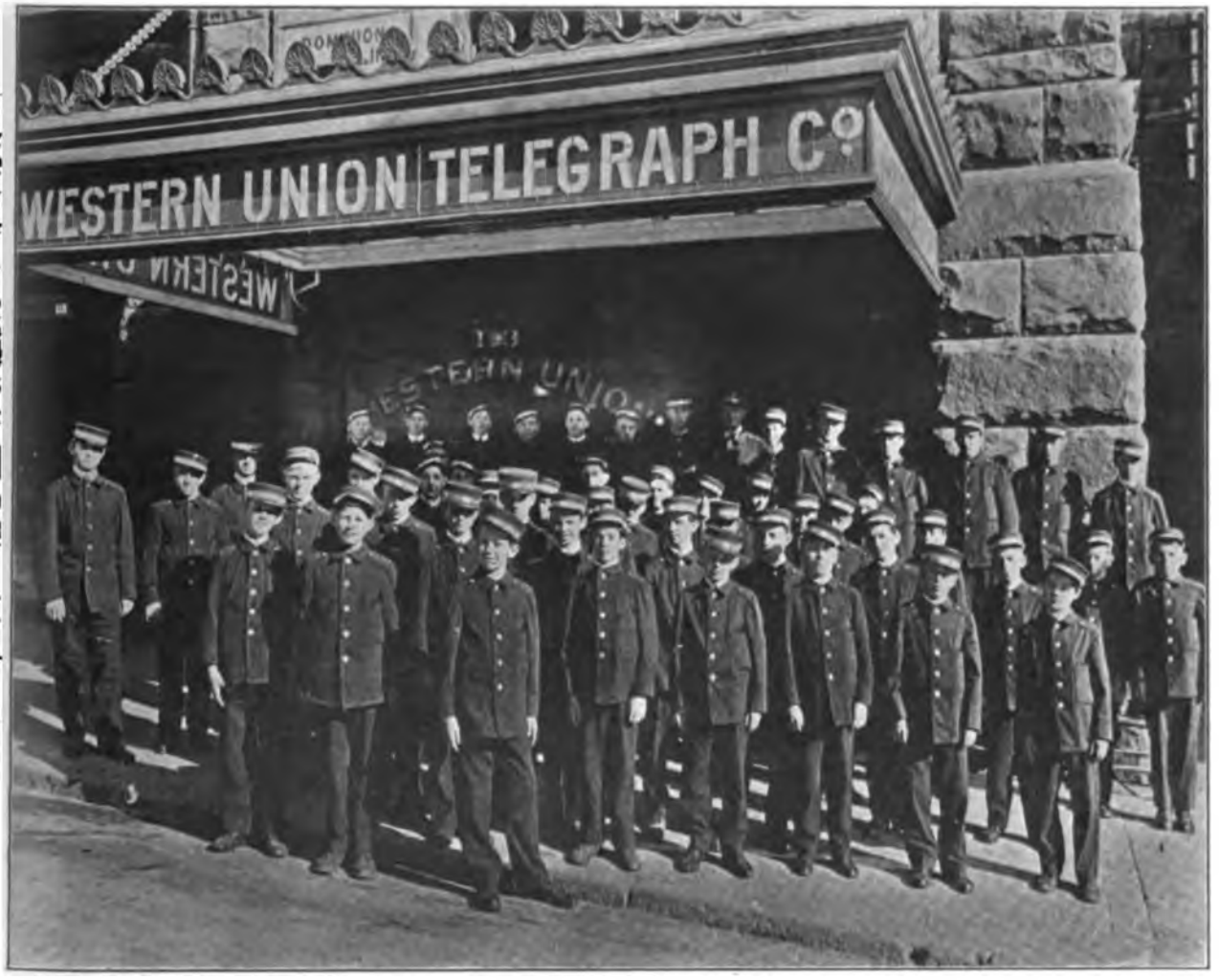
Seattle Western Union Messengers.

The accompanying illustration shows the messenger force of the Western Union Telegraph Company at Seattle, Wash., and the unusual bright and intelligent appearance of the young men will be at once noticed.

In sending us the photograph from which the cut was made Mr. E. Boening, district commercial superintendent at Seattle refers in complimentary terms to his messenger force. He states that it is unsurpassed in intelligence, discipline and ability to handle every character of service entrusted to it.



MESSENGER FORCE OF WESTERN UNION TELEGRAPH COMPANY AT SEATTLE, WASH.

The organization and recruiting of the force is the result of patient effort and hard work, and by providing sanitary quarters and treating the boys fairly the company has secured the good will of the general public in its efforts to build up a first-class messenger service.

"There are approximately fifty-five messengers on our force," writes Mr. Boening, "and by securing the right kind of boys, we have, in less than a year, been able to promote sixteen of them to positions in the operating, bookkeeping, delivery and other departments, where each one of them is making good, thus demonstrating that the careful selection of material for messenger forces is of the greatest advantage, not only to the boys themselves, but to the company. The discipline maintained is perfect, and the day and night forces are supervised by a 'sergeant' who keeps the boys up to the mark, and especially sees that the raw recruits are fully instructed as to their general behavior and the proper performance of their work.

"The boys are provided with clean quarters, in which there are adequate wardrobe facilities, together with lunch tables and instruments to permit of their practicing telegraphy when opportunity offers."

Mr. T. F. Keech, subscriber's representative of the Michigan Telephone Company, Ann Arbor, Mich., writes: "I like the advice given to young men as published in TELEGRAPH AND TELEPHONE AGE. It is what is needed. If followed it will bring success to every man."

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Hints to Managers.*

BY I. N. MILLER, DISTRICT COMMERCIAL SUPERINTENDENT, WESTERN UNION TELEGRAPH COMPANY, CINCINNATI, OHIO.

The dictionary definition of the word manager is "One who manages; a person who conducts business with economy and frugality." A manager of a telegraph office is one who is not only economical in the expenditure of money and applies what is spent to a profitable purpose, but one who can solicit and secure patronage or, in other words, sell what his employer has to sell. Telegraph companies have service to sell; the service consisting principally in transmitting quickly correspondence and communications, which, owing to their nature can not be transmitted by mail in time to answer their purpose.

The most successful manager is one who can sell the most service and get the most for it. It is true that rates are uniform, but what the corporation gets is the difference between receipts and expenses, and this varies in proportion to the efficiency of the management.

The best manager is, therefore, one who produces the best results, not for a week or month, but for years. To underpay or overwork employes will not produce the best results, as they will resign and frequent changes demoralize the force. The successful manager in this direction is one who pays what labor is worth in the market and demands honest service in return. The treatment, surroundings and conveniences must be such as to attract and satisfy the employes; then they have no incentive to resign and go elsewhere and the best results are secured.

In the present day in this country competition in almost all industries is active and it requires very careful management to secure satisfactory results. Managers of the various industries who patronize the telegraph the most freely are often hard working persons with a multitude of detail and they are easily affected either in our favor or against us. A single kind act will often cause them to be your friend and they will favor you with their business or the least slight or injudicious remark will cause the reverse.

A manager should be personally acquainted with his customers because he can then tell best how to favorably impress them. The old adage: "Where one will not, two cannot fight" is applicable to the telegraph business. The successful manager must have complete control of his temper, as it often happens that the persons controlling the largest patronage are at times the most unreasonable, and nothing but the most skilful tact will prevent the loss of business.

The successful manager must be tactful in selecting, retaining and working his force. He must cultivate a personality that is pleasing and attractive to the public in order to attract patronage and if he accomplishes this, he must watch every detail of the service and know personally that all employes are performing their duties properly. Every complaint from customers must be courteously and promptly looked after, and above all stick to the truth and do not try to deceive them. If they once find you tricky or dishonest, they will never again have any confidence in you.

In order to attract business, there are many things that should not be overlooked. If a business man enters a telegraph office and finds everything in disorder, the employes boisterous and apparently unemployed, the room dirty, it gives at a glance the impression that the manager or person in charge is not worthy of the title he bears and the visitor has little confidence in the service he can secure.

The manager of a telegraph office receives the highest salary at that office and should be the most active worker. If he doesn't work, no one else will render the service a successful business must have. The managers of telegraph offices as a class are above the average of intelligence. They come into contact with the best business element and have great advantages, which in other lines of business, they would not have. If there is any development in a young man, it will have every opportunity to grow and expand in the position of manager. But to grow means to work, and he who does not like work, and is always looking for an easy position, will soon be distanced and there is no future for him. If a manager has the talent to attract business and successfully handle men, but cannot control himself and spends the company's money, he has committed an unpardonable offense and all other good qualities come to naught. The money is what corporations are in the business for, and any one who undertakes to take this away from them wrongfully will never again be able to gain their perfect confidence.

*Journal of the Telegraph.

Cincinnati's First Telegraph Office.

The following interesting facts are gleaned from the Christmas number of the "Seventh District Blue Book," published by the Western Union staff at Cincinnati, Ohio.

The first telegraph office in Cincinnati, Ohio was opened for business August 20, 1847. Mr. C. T. Smith was the operator in charge. The next day, under the caption "The First Flash," the Cincinnati *Gazette* said, among other things:

"Cincinnati and Pittsburg shook hands yesterday afternoon and exchanged compliments by means of Mr. O'Reilly's telegraph."

On September 24, 1847, the Cincinnati *Gazette* announced the completion of the O'Reilly line to Louisville, Ky., the House printing telegraph being used.

One of the first circulars issued read as follows:

"To all Offices—I understand it is becoming common for some operators to receive by sound; never do this; do not trust your ear; always let your paper run.

(Signed) J. D. REID, Supt."

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Telegraph and Telephone Age

Entered as second-class matter, December 27, 1909, at the Post-Office at New York, N. Y., under the act of March 3, 1879.

Published on the 1st and 16th of every month.

TERMS OF SUBSCRIPTION.

One Copy, One Year, in the United States, Mexico, Cuba, Porto Rico and the Philippine Islands	$2.00
Canada	2.50
Other Foreign Countries	3.00

ADDRESS ALL COMMUNICATIONS TO
J. B. TALTAVALL, - - - Publisher
253 BROADWAY, NEW YORK.
T. R. TALTAVALL, Editor.
R. J. WEEKS, Manager Advertising Department.

CABLE ADDRESS: "Telegage," New York.
Telephone: 6557 Barclay

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.

December 16, 1911.

Knowledge vs. Money.

There are some persons connected with the telegraph and telephone services who think that what they and other employes need is more money rather than more education. Verbal statements and letters to this effect have been made to and received by us, and it seems hardly possible that any one in these enlightened days can soberly entertain such views in the abstract. However, it is one thing to make a statement and another thing to believe it, and few men are consistent in this respect.

We do not agree with our complainants that money should take precedence over knowledge in our material affairs. We do not doubt that there are many cases where more money would do good, but we also know that in many instances where persons think they ought to have more money it would do them more harm than good if they had it. The great trouble is that most of us allow ourselves to be completely dominated by the desire for financial gain. Money is a good thing when properly utilized, and the desire for and acquisition of it for other than selfish purposes is highly commendable, but the fact is indisputable that most people yearn for money in order to satisfy their craving for things that do them no good.

In all ages knowledge and education have been held to be the most desirable possessions of man. A man with knowledge and experience has the foundation for the acquirement of money. Money, of course, is necessary for our well-being, as well as knowledge, and both should be used wisely.

If men would bear in mind that knowledge can buy money and that money cannot buy knowledge they would get a more accurate perspective of the facts of existence.

He who neglects to improve his opportunities because he thinks he is entitled to more money for his present services, is an obstructionist, not only to himself, but to his employer. As a rule, he would get more money if he were worth it, and the rule very generally holds good.

If men would adopt the principle of living within their incomes and increase their earning power by increasing their knowledge there would not be so much dissatisfaction with present conditions.

The Welfare of Messenger Boys.

It sometimes seems as if the telegraph companies were trying to eliminate the messenger boy from the service by the introduction of modern ideas and improvements, but the boy still survives and it is not likely that his duties will be dispensed with very soon.

In the development of the telegraph business the messenger receives as much consideration as any other branch of the service, and the lot of the present-day boy is infinitely superior to that of his predecessor of a few years ago. In the larger offices the boys are afforded opportunities to learn the higher branches of the business, such as operating, bookkeeping, etc., and the tendency is to make clean men of them, mentally and physically, baths, besides other helpful agencies, being provided for their physical needs.

We have several times in the recent past published pictures of messenger forces in different cities and in this issue we present one of a messenger force at Seattle, Wash. In studying the faces of the boys in this picture it will be noticed at once that they manifest intelligence to a greater degree than is usually found in an average group of the same number of boys anywhere. By exercising care and wisdom with reference to the selection of their messenger boys the companies are storing up sound material for the future upbuilding of their main structure.

Proposed Monument to the Late James D. Reid.

The proposition to erect a monument over the grave of the late James D. Reid, at Rochester, N. Y., which was suggested by president Charles P. Bruch at the Magnetic Club dinner on November 15 is meeting with hearty acquiescence and support.

For many excellent reasons the last resting place of one who was so beloved by his associates as was Mr. Reid should be marked in more fitting manner than by a small headstone. The great telegraph fraternity owe it to his memory to express their appreciation of the interest he took in their behalf and recognition of his sterling character. He was the first telegraph superintendent; the first president of the Telegraphers' Mutual Benefit Association and one of its most active promoters, and one of the organizers of the Old Time Telegraphers' and Historical Association and a former president, besides being the author of a volume of telegraph history and other works

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of like character. The memory of a man who has devoted so much of his life in the interest of his fellow men certainly deserves to be perpetuated for the benefit and admiration of posterity.

Two telegraph organizations have already taken co-operative action in the matter, in addition to the Magnetic Club, viz.: the Society of the United States Military Telegraph Corps and the New York Telegraphers' Aid Society, and others will unquestionably do likewise in due time.

It would require much space to enumerate the various official positions held by Mr. Reid during his telegraph service between 1845 and 1890, when he became United States Consul at Dunfermline, Scotland.

Telephone Superseding the Telegraph.

The use of the telephone for train dispatching purposes in this country has been growing for several years and its practical superiority over the telegraph has been demonstrated beyond question. Many of the railway telegraph superintendents are now introducing the telephone on their lines for message service and we see in this fact the opening up of great possibilities. If the telephone can be used successfully by railroads in transmitting their service messages what is to prevent its more general use for public business?

A silent revolution is going on in the transmission of intelligence but how it will end it would be rash for anyone to predict. At the present time the telephone seems to be the more active and shows a tendency to drive its older relative —the telegraph—into outer darkness. The great strength of the telephone lies, of course, in its wide range of applicability and its flexibility.

The railroad telegraph superintendents may or may not realize it, but they are performing a great work in the universalizing of the telephone as a means of communicating intelligence to distant points.

Some Observations from Mr. Edison.

Mr. Thomas A. Edison denies that he intends to experiment with his storage battery for aeroplanes. He says he has not experimented with aeroplanes for thirty years.

"I keep close to earth," he said. "If I experimented I'd break my neck the first week."

Among other characteristic remarks Mr. Edison said:

"I still get lots of suggestions from cranks. They want my idea on everything from a washing-machine to a rat trap. Most of them talk perpetual motion.

"Yes, I'm still working on the old schedule. About four hours' sleep. I had a hundred men working for me once on that schedule, and they were a healthy bunch. I don't take any exercise except what I get walking around in the laboratory. Eat everything but only a little. I only eat when it is necessary, about one-fourth as much as the average man. Just enough to keep up my 170 pounds. I've got a scale in my bathroom. I hop on that every few days. If it's below 170 I eat little more just to raise the ante. I bolt everything, but I eat so little that it doesn't hurt me. I like mince pie, fine. Everything is brain food. I don't eat the breakfast foods. We have a boiler inside of us, and we just fill it up with fuel. We are nothing but machinery, meat machinery.

"Is there a chance for the young man? Yes, better than ever. A man came to me the other day and asked for two $10,000 men. I couldn't furnish them. There are plenty of threes in the world. Few tens. The college man is not the practical man. Colleges are better than they once were, but they aren't practical yet. They are all right for lawyers, but this country needs engineers, not lawyers. Colleges are for the social side and for the literary. Not worth while, generally."

Electrical Testing Made Easy.

In describing the methods of transmitting dispatches, etc., in the new headquarters of the Union Pacific Railway, Omaha, Neb., a daily newspaper reporter got beyond his depth when he undertook to enlighten his readers on the technical features of the plant.

"Another device that has been installed in the telegraph department," he says, "is the trouble locator. When a wire fails to work as it should, the trouble indicator is attached to the particular line and it commences to get busy. It is an apparatus having a dial something like a small clock, but instead of its face being divided into spaces indicating hours, it shows only ohms, and there are any number of them.

"The ohm is a telegraph measurement and there are eight of them to the mile. The pointer on the dial moves around like the second hand on a watch, and if there is trouble out between here and Cheyenne it stops at the figure indicating the number of ohms distant from Omaha where this particular trouble is located. Then the superintendent of the service simply divides the number of ohms by eight and he has the trouble spot pretty closely located. Then all there is to do is to get in communication with the linemen at the nearest point and get them started on the repair work."

Mr. G. W. E. Atkins, vice-president of the Western Union Telegraph Company, New York, in remitting to renew his subscription, writes: "I shall gladly aid in the expansion of your circulation as I regard your paper as eminently practical and useful."

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.

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

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(Continued from page 796, December 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 will be 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.]

ALGEBRA.

Algebra is that branch of mathematics in which the quantities are represented by letters, and the operations to be performed upon them are indicated by signs.

The sign + is called the plus sign and indicates the addition of two or more quantities. Thus, a + b denotes that the number represented by a is to be added to the number represented by b.

If a quantity be added to itself several times, we generally write it but once, and then place a number before it to show how many times it is taken. Thus, a + a + a + a + a = 5a. The number 5 is called the co-efficient of a, and denotes that a is taken 5 times.

When the co-efficient is 1, it is generally omitted. Thus, a and 1a are the same.

The sign — is called minus, and denotes that one quantity is to be subtracted from another. Thus a — b is read, a minus b, or a diminished by b.

The multiplication of quantities which are represented by letters is indicated by writing the letters one after another without interposing any sign. ab signifies the same thing as a × b.

There are two signs to denote division a ÷ b and $\frac{a}{b}$

Every quantity written in algebraic language, that is with the aid of letters and signs, is called an algebraic quantity or the algebraic expression of a quantity.

Thus, 3a is the algebraic expression of three times the number a.

3a — 5b is the algebraic expression of the difference between three times a and five times b.

When an algebraic quantity is not connected with any other by the sign of addition or subtraction, it is called a *monomial*, or a quantity composed of a single term. Thus, 3a, 7ab are monomials, or single terms.

An algebraic expression composed of two or more parts, connected by the sign + or —, is called a *polynomial*, or quantity composed of two or more terms.

Thus, 3a — 5b is a polynomial.

If two or more terms of a polynomial contain the same letters, they are called *similar terms*.

Thus, in 7ab + 3ab — b, the terms 7ab and 3ab are similar.

When a polynomial contains similar terms it may be reduced to a simpler form. Thus, the expression 3ab + 2ab is evidently equal to 5ab.

In adding similar terms we take the sum of the co-efficients and annex the literal part, that is, the part denoted by letters.

Example: Reduce the polynomial abc + 4abc + 5abc to its simplest form.

Solution:

abc
4abc
5abc
———
10abc
———

NOTE. The first term abc has a co-efficient 1 which is understood.

Of the different terms which compose a polynomial some are preceded by the sign +, and the others by the sign —. The former are called additive terms; the latter, subtractive terms. When the first term of a polynomial is not preceded by any sign, it is understood to be affected with the sign +.

Example: Reduce to its simplest form the expression

3ab + 5ab — 3ab + 4ab — 6ab — ab.

Solution:

Additive Terms	Subtractive Terms
+ 3ab	— 3ab
+ 5ab	— 6ab
+ 4ab	— ab
Sum + 12ab	Sum — 10ab

But 12ab — 10ab = 2ab.

Hence for the reduction of the similar terms of a polynomial we have the following:

RULE (1). *Add together the co-efficients of all the additive terms, and annex to their sum the literal part; and form a single subtractive term in a similar manner. Then subtract the lesser co-efficient from the greater, and to the remainder prefix the sign of the greater co-efficient to which annex the literal part.*

Example: Reduce the polynomial 4abc — 8abc — 9 abc + 11abc to its simplest form.

Additive.	Subtractive.
4abc	— 8abc
11abc	— 9abc
15abc	— 17abc

15abc — 17abc = — 2abc

NOTE. The smaller co-efficient being 15, it is subtracted from the — 17, and the — sign prefixed to the remainder.

(*To be Continued*)

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Deep-Sea Cable Repairing.

BY DAVID LYNCH, DIVISION CABLE ELECTRICIAN, WESTERN UNION TELEGRAPH COMPANY, NEW YORK.

When a submarine cable is broken the fault is located from the shore stations at both ends and the results compared. It sometimes happens that the broken ends present different conditions for testing, so that the tests from each end will be of a different character. It has frequently happened that injury caused by ship's anchors will leave the conductor well exposed at one end and insulated or partially insulated at the other end. In the latter case the pressure of the water closes the gutta percha over the end of the conductor. The condition of the end indicates to the electrician the nature of the test best calculated to give accurate results.

The tests most generally employed are insulation, conductor resistance and capacity. The conductor resistance test is the one most frequently used in locating faults, and the methods employed vary with the conditions. If a second cable is available between the two stations a loop test can be taken, but if not, straight single line tests are taken from both ends. If the cable is completely parted a "break test" is used. The Kennelly system is very good, the theory being that if the testing current is increased four times, the resistance at the break is reduced one-half. If the cable is only partially grounded and weak signals reach the distant end the Blavier test can be used, and if the cable shows only a slight escape an overlap test will give good results.

The great difficulties encountered in deep-sea cable testing as compared with land cables are due to strong earth currents, polarization at the fault and high static capacity. Frequently the earth current varies very rapidly and consequently the balancing is done to false zero, that is, to the deflection of the galvanometer from the derived earth current when no local battery is on the cable. The polarization at the fault varies according to the condition at the end. It will be strongly noticeable if the cable is parted and the end gets buried in mud, thereby making a small copper surface contact with an irregular muddy substance; or, if the insulation gets bruised through mechanical injury from rocks and ships' anchors when a good contact is not made between the copper conductor and the iron armor of the cable. The fault will polarize with either pole of the battery depending on the nature of the injury. As a rule the zinc pole of the battery will clean a fault and the copper pole will partly seal it up, but where the injury is such that only a small hole admits the salt water to the conductor, hydrogen bubbles will be formed on the surface when the zinc pole is used, which will tend to partly insulate the cable at the fault. In such cases tests are made with the copper pole to line. Much depends on the experience of the electrician in judging the methods to be used under widely varying conditions.

It is difficult for the amateur to tell whether the throw from the cable is due to static capacity, polarization or earth currents.

If the end should be insulated a static capacity test is taken. For lengths up to about 50 miles fairly good results can be obtained with the ordinary comparative throw method, using a standard condenser to compare with the cable, but with longer lengths a balancing system is used, similar to the Wheatstone bridge method. A high capacity condenser is put in series with the cable and resistances are arranged the same as are the arms of a Wheatstone bridge, which can be adjusted to bring the charge of the condenser and cable to the same potential. The various tests have been fully described in text books on submarine cable working.

After the fault is located the position is noted on the chart which shows the route of the cable as laid. This gives the navigator of the repair ship the latitude and longitude where it is necessary to place the ship. On arriving at the position, nautical observations are taken to confirm the position, and the ship is then placed as near as possible to where the fault was located. Soundings are then taken to get the depth of water. A mark buoy is next placed on the line of the cable with the necessary amount of buoy rope and chain to reach the bottom. Attached to the chain is a mushroom anchor which keeps the buoy in position. On top of the buoy is placed a staff about eight feet long which carries a flag or bunting at the top and two large lamps near the base. These lamps will burn about four days or longer according to whether oil or gas is used. This buoy then serves as a marker to operate from.

After placing the buoy, the ship is moved to a point about two miles from the cable line and a grapnel is lowered which is slowly dragged along the bottom across the line of the cable. This grapnel is made with a strong iron stock having protruding curved prongs which engage any obstruction met while being dragged over the bottom. The rope attached to the grapnel passes over the horizontal drum of the cable machinery where several turns are taken around the drum, the number of turns depending on the depth of water. This rope also passes under the sheave of the dynamometer which registers the strain that the grapnel encounters.

If the grapnel should strike against a rock a sudden jar is usually felt on the dynamometer and the grapnel slides off, but when the cable is hooked, a steadily increasing strain is noticed on the dynamometer indicator. When this latter indication is noted the ship is stopped and put astern to ease up the strain on the cable. The cable engine is then thrown into gear with the horizontal drum and the grapnel rope is slowly hove in. When the grapnel reaches the bow sheaves with the cable, the heaving-in engine is stopped and strong Manila ropes are attached to the cable on each side of the grapnel and securely stoppered. The cable is then cut at the bight between the

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ropes and one end is paid out and the other picked up at the same time. The end on board is immediately connected with the testing room, where the electrician calls up the shore. A man is continually kept on watch at the shore stations from the time the ship is expected on the ground until the repair is completed. If the shore answers the call, the electrician takes a quick test for insulation and conductor resistance, usually taking only a few minutes to do this. If he finds the cable normal he notifies the shore that the end will be buoyed temporarily.

The other end is then connected to the testing room and the distance to the fault measured. After getting his figures the cable is hove in until the fault comes on board. If it is a complete rupture the other end has to be grappled for in the same way as before.

When communication is established with the second shore station, and the cable testing satisfactorily, the end is spliced on to the cable in the ship's tank. After the splice is completed the ship pays out sufficient cable to reach the end which was left buoyed. While paying out communication and testing is kept up, so as to watch for any weaknesses that might develop during the work.

On reaching the buoyed end the buoy is taken on board and the rope leading from the buoy to the cable is hove in by means of the cable machinery. When the cable end is reached, it is again connected with the testing room and re-tested. The distance to shore can be told from the conductor resistance obtained, and is usually in accord with the position determined by the nautical observations.

The cable now testing "O. K.," both ways, the two stations are notified that the final splice will be made and communication restored in about one hour. When the splice is completed ropes are attached on each side of the splice and the cable is slipped overboard gently by slacking up on the ropes. When sufficient rope has been paid out to assure that the buoyancy of the water relieves the strain on the splice, the ropes are cut and the cable sinks to the bottom. The ship then proceeds to pick up the mark buoy and the operation is complete.

It frequently happens that several buoys have to be placed where more than one break has occurred in the same locality or the cable may part during the picking-up operations, owing to weak armor, as in the case of old cables.

Mr. A. J. Hartman, manager of the North American Telegraph Company, Red Wing, Minn., in renewing his subscription for another year send us the following:

"I never have seen the Ocean
"I never have seen the Sea
"The Banks of the Mississippi
"Are grand enough for me."

and adds "Keeps the AGE a-rolling in to me."

Dispensing With the Repeating Sounder.

BY E. C. DAVIS, PLANT DEPARTMENT, WESTERN UNION TELEGRAPH COMPANY, SAN FRANCISCO, CAL.

Referring to Mr. J. P. Ferriter's article in TELEGRAPH AND TELEPHONE AGE for November 16, relative to dispensing with the repeating sounder between the neutral relay and the operating local, I desire to say that I tried this arrangement between Los Angeles, Cal., and Flagstaff, Ariz. I had Flagstaff reverse his long end and tap, taking the local off the rear point of the neutral relay, direct at first, but later I inserted the repeating sounder after reversing the points on it. My idea in doing this was not to dispense with the repeating sounder so much as to have the short end of my battery oppose the incoming signals, Flagstaff having it repeatered into a single wire. For this reason it is to be recommended, but I think Mr. Ferriter would find that he would be unable to dispense with the repeating sounder should there be the least break-over from the pole-changer, or should there be any appreciable amount of power induction such as we experience on the coast wires. However, I have not had the opportunity to test this arrangement with the new quadruplexes, and it would not surprise me if, with the advantage of the holding coil and a variable condenser, it were not possible to do away with the repeating sounder, provided the closed key at the distant end is used for the short end.

Special Telegraph Line Construction.

The Postal Telegraph-Cable Company was required to change the location of its telegraph line in the locality of the Kensico Reservoir, in Westchester County, New York, which is to form part of the new waterworks system for New York City. The city gave a new location, where, by the construction of cement foundations and tall steel poles, the wires could be raised above the water of the reservoir itself.

Cement foundations and steel poles are required in order to carry the wires over long spans of from 300 to 600 feet, which means great pressure at times from sleet and wind. Accordingly, steel lattice poles were adopted. The angle irons which form the corners of these poles are extended downward a distance of seven feet from the bottom of the poles and are imbedded in the concrete base. The distance from the ground to the top of the pole is fifty-eight feet, twenty-three feet being the height of the cement base and thirty-five feet being the height of the iron lattice work. When the reservoir is flooded the water will reach within five feet of the top of the concrete base. The cost of constructing this extraordinary telegraph line is borne by the City of New York, the change having been made for its accommodation and the work is being done under the supervision of the plant department of the Postal Telegraph-Cable Company.

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Reminiscences of Charles Minot.

Two interesting communications have been received from Mr. H. H. Atwater, of Brooklyn, N. Y., and Mr. Geo. M. Huntington, of New York, giving reminiscences of the late Charles Minot, general superintendent of the Erie Railroad, who was the author of the first telegraphic train order, the sending of which is to be commemorated by a monument to be erected at Harriman (formerly Turner), N. Y., next spring.

Mr. Atwater writes: "As near as I can remember, it was about 1855 or 1856 that I commenced to learn telegraphy in Burlington, Vt. Learning that the 'New York & Erie Railroad' was offering good positions for operators, my brother, who had learned in the same office and had accepted a position on the Erie at Waverly, N. Y., sent for me to join him, which I did, and was given a position as night operator at Corning, N. Y. This was in 1857. Later I was transferred to various offices where most needed, but mostly on the Susquehanna Division. I never worked in Mr. Minot's office.

"Mr. Minot had gotten up a Book of Rules containing forms to be used for the movement of trains by telegraph. Train dispatchers were appointed for each division to give orders as required, according to forms in the book, to trains entering upon their divisions. Geo. M. Huntington, an ex-military operator, and Chauncey Gardner were the train dispatchers of the Susquehanna Division. Mr. Minot was always very kind to operators. If applied to for a pass he would likely send a 'monthly.' The last office I was ordered to was at Susquehanna depot, of which office I was made manager. It being the junction of the Delaware and Susquehanna divisions, we were constantly receiving train orders from Port Jervis for trains on the Delaware Division and from Elmira for those on the Susquehanna. Higher positions on the road were almost always filled from the ranks of the telegraph. The operator at the next station eventually rose to the presidency of the road, while my own messenger boy, W. J. Murphy, in later years got to be general manager—the position formerly occupied by Mr. Minot.

"In 1863 I resigned my position and entered the service of the military telegraph."

Mr. Huntington writes as follows: "I was one of Mr. Minot's train dispatchers and could talk a week or two of the conditions and irregularities as well as the advantages and time economies of those old Erie days. Luther G. Tillotson was Mr. Minot's superintendent of telegraph. He and I were chums, but I went to California in 1850—the same year he was appointed superintendent—and did not return until 1853. We corresponded all those years. He told me all about the workings of the Erie and made me 'division operator' on the Erie as soon as I returned. But you need not search for any such things as train order blanks or prescribed rules for the running of trains under the Minot administration. It was after the coming of Gen. McCallum, who succeeded Mr. Minot as general superintendent of the Erie, that the thing was systematized to a certain extent, and it was one of McCallum's train orders ("Blank A") that was the cause of my being afterwards made superintendent of military railroads.

"General McCallum was a very stern looking man. Men said they would as soon be discharged as have him look at them. I was then train dispatcher of the Susquehanna Division at Owego.

"When a package of blanks 'A' first reached me, after reading one I said: 'The man who made that order didn't know a d—d thing about train dispatching.' Some one heard me and promptly reported my remark to Mr. McCallum. Next day I was sent for to come to Mr. McCallum's house. I went with fear and trembling, 'leaving all hope behind.' He was busy writing when I arrived, and told me to sit down. Later he picked up one of the blanks, turned to me and said: 'George (!) "I understand you said, "The man who made this order etc."' I said, 'Yes, sir.' 'Well,' said he, 'the trouble is you are right! I do not know much about it because it is in its infancy, and has to be to a certain extent experimented with. Now go on and criticize this order.'

"I showed him how under certain circumstances it would block the road. He said: 'Yes, I see, but the order is there and must be lived up to until I see a way to change it,' which he did not long afterwards, sending me the proofs of that and subsequent rules about train dispatching to criticize. He also did this when I was under him during the war.

"Tillotson was really a prime mover in the telegraph train dispatching business, but of course he was Mr. Minot's man. He originated the old code: '1, Wait a minute. 2, What time is it? 3. Have you any answer? 4. Where shall I go ahead,' etc.

"Here is a sample of the train orders of that early period (1853 or 1854). I was division operator of the Eastern Division at Port Jervis. A man named Westervelt was train dispatcher of that division. I seldom saw him except at breakfast at the Delaware House, when he would call to me across the table. 'Say, Huntington, if Blauvelt asks you anything from Suffern tell him yes, and sign my name to it!' That is all the order I ever knew him to give while I was at Port Jervis.

"Mr. Minot was not as particular as he should have been to obey his own rules. He used to come up over the road on a little engine we used to call the 'tea kettle,' hauling one coach, but he generally rode on the engine—running it himself. One time when I was train dispatcher of the Susquehanna Division at Elmira he came over the road 'wildcat.' I did not know he was coming beyond Susquehanna; in fact, I believe he originally intended to return from there. The Delaware division train dispatcher got him into Susquehanna all right. I had a work train on the double track between Great Bend and Binghamton with the right to use both tracks 'wildcat.'

"Mr. Minot after dining at Susquehanna jumped on his 'tea kettle,' and, without the formality of asking for orders, pulled out for Elmira, supposing that as it was double track it was safe enough. The consequence was when he got a little west of Great

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Bend he bumped into the work train going east on the westbound track. Fortunately, it was a piece of straight track, and there was only a slight thump. The work train ran in at Kirkwood and let him by. Then he asked for orders. When he saw me at Elmira all he said was, 'How de do? I 'urt my 'ed,' and passed on. I was in California at the time of the episode at Turner and do not know if there is a man alive who was there. Harry Sweetser, who used to be a conductor on the Erie, and was afterwards a banker at Corry, Pa., was a favorite of Mr. Minot, and I think was with him at Turner at the time."

Report of Chief Signal Officer.

The report of Brigadier General James Allen, Chief Signal Officer, U. S. Army, for the fiscal year ended June 30, 1911, has been issued. It is a pamphlet of twenty-six pages and contains an excellent map of the U. S. Signal Corps telegraph and cable system in Alaska. The following interesting facts are taken from the report:

The Washington-Alaska military cable and telegraph system consists of 2,633 miles of submarine cable, 1,125.5 miles of land line and nine wireless stations.

During the year "this line" receipts aggregated $192,093. The "other line" receipts aggregated $16,633. Official messages to the value of $152,215 were transmitted. Telegraphic money transfers to the value of $69,472 were handled. Press rates have been materially reduced.

During the year the wireless plants at Fort Egbert and Fairbanks were changed from three kilowatts to five kilowatts, and a proportionate increase in efficiency has been realized. This increase in power has made it possible to maintain wireless communication between the two stations named and Circle City, Alaska.

The military telegraph system operated and maintained in the Philippine Islands comprises thirty-four miles of land line and ten offices. In addition to this there are four long-distance telephone lines with a total length of 106 miles and thirteen offices. There are now in operation in the Philippine Islands seven Army wireless stations.

One of the principal features of the army signal school at Fort Leavenworth, Kan., is the electrical laboratory, which is fitted up for the individual instruction of the student officers. At another part of the post there has been located a three-kilowatt wireless station, which communicates with Forts Omaha and Riley.

Post telephone systems were installed at Fort D. A. Russell, Wyo., and Fort Douglas, Utah. At the first-named post the entire system is underground, with the exception of a few outlying lines, and the equipment is the newest and most modern thus far used by the Signal Corps. A smaller telephone system embodying many of the features of the Fort D. A. Russell installation was provided for Fort Douglas, Utah.

At the close of the fiscal year there were 114 post telephone systems in satisfactory operation in the Army, of which fifty-one were extended central-energy systems.

As regards international wireless telegraphy, the report says the adherence of the United States to the Berlin treaty not having been confirmed by the Senate, this Government has no official standing in the International Bureau at Berne. In the official list of the Berne bureau of the radiotelegraph stations open for international traffic, which shows the land and ship stations conducted by the twenty-three countries and their colonies that have ratified the International Wireless Telegraph Convention of 1906, together with the calls and full instructions regarding the kind of communication which all stations are bound to recognize, no mention whatever is made of the wireless-telegraph stations of the United States.

Another international wireless conference is called to meet in London next June. The United States will be asked to send representatives, but they will not be able to take direct part in the conference owing to the fact that the United States is not a contracting party to the Berlin treaty.

The failure of the United States to adhere to the Berlin treaty, the report says, leads to great inconvenience to vessels bearing the United States flag, as it is only through courtesy or by some private arrangement that our ships can communicate with stations located in foreign countries.

There continues to be confusion in the transmission of wireless messages on the coasts of the United States which interferes with communication between various coast defenses and our ships at sea. The Army now has fifteen telegraph stations located at military posts in this country, nine stations in the territory of Alaska and one in the Philippine Islands.

Copying Behind in Alaska.

A good story is told in the *Yukon Valley News* of Tanana, Alaska, of an operator in that far-off place who was receiving a long message on the typewriter. Suddenly one of the types in the machine caught in the ribbon. The operator took out his pencil and punched two or three times at the letter. Finding he could not fix it that way he unhooked the carriage and took it off. Then he got the letter out; wound up the slack in the ribbon; replaced the carriage and started in to catch up with the sending operator who had all the while been pounding away without a stop. The sending operator was then about seventy words ahead of him. The only thing that kept the eyes of a young operator who was watching the proceedings from popping clear out on the floor was the fact that the operator did not take the trouble to put on a new ribbon.

Mr. C. E. Jones, manager of the Western Union Telegraph office at Zanesville, Ohio, in renewing his subscription writes: "I am certainly pleased that you kept the AGE coming right along. Keep it coming."

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The Most Historic Spot in New York.

"The most historic spot in New York," says Mr. Walter P. Phillips in the *New York Times* of November 26, "as far as recent times go, is the room in the building at the corner of Liberty Street, the celebrated 145 Broadway, now occupied by Benedict Brothers. In the room corresponding to this store in a building long since demolished to make way for this new one, all the reports of the great events leading up to the civil war and during its progress were received over the wires of the American Telegraph Company and its connecting lines. Here were concentrated the wires of all the telegraph companies that were in existence in the days when Lincoln and Douglas were making their speeches and contesting the political ground of Illinois inch by inch. The great telegraph company in those days was the American presided over by Colonel E. S. Sanford and the late Marshall Lefferts, the gallant colonel of the Seventh Regiment."

Persons visiting the Benedict store are often seen to point to certain places on the floor and tell those who are with them that "here stood the table on which I received from Washington the news that Fort Sumter had been fired on," or that, "over there I received the news, four years later, that Richmond had fallen. I can hear the click of the instrument even now reminding me of Poe's reference to the bells whose voices a tale of misery foretells." Another visitor will say,"over in that corner Fred Catlin received the story of Lincoln's assassination, and right here to our left Ed. Schermerhorn copied the news of our disastrous defeat at Bull Run." The whole place is redolent of memories—the receipt of great stories of Union triumphs written by men who afterwards became famous as war correspondents, editors and artists, including Whitelaw Reid, the well-known "Agate," of the Cincinnati *Gazette*, Frank Millet perhaps the greatest of all American painters, Murat Halstead, and Henry J. Raymond. "After McClellan's victory at Antietam," mused another, "Lincoln issued his emancipation proclamation which shook the foundations of the world, one might say, and that was received, I remember, by Dixon F. Marks, night manager of the office. He was a southern man and he could not be kept away from the wire. This is the beginning of the end,' he observed as the perspiration rolled from his face and the tears came to his eyes. And so it went—one great history-making event after another."

"Right in the centre of the room here stood the table where the Boston wire came in," said another visitor," and it was worked by Walter P. Phillips with John E. Wright, the well-known inventor of printing telegraphs. Besides handling upward of four hundred messages every day, Jack and Walter disposed of all the cable business that there was. It was concentrated at New York from all directions and carefully sent to Boston and then on to Plaister Cove, N. S., whence it was relayed to Heart's Content, N. F., where the cable landed. There was very little of it, the rate at first being one hundred dollars for ten words or less, which later was changed to one dollar a letter." Another old operator will wander about the room, and pointing here and there will tell his friends that, "I sat at a telegraph desk not six inches from where my cane rests and took the first despatch that brought Grant into prominence. Halleck was ordering him to do all sorts of strange things in the southwest and the only response that he could elicit was the resignation of U. S. G., which he tendered again and again. We used to get some of those despatches from Cairo over the slim plant of an up-state corporation which had its offices upstairs in limited quarters. Generally messages for the War Department reached Washington from Cincinnati but wire troubles, of which there were many, often sent military telegrams around through New York. This company, up stairs, was the Western Union which, in 1866, absorbed the American Company and the United States Telegraph Company, the latter an opposition that had grown up during the later years of the war and which was headed by William Orton who became the president of the Western Union after the consolidation. That amalgamation of telegraph properties went on until 1887, when the thirty-third system was absorbed—the one that was exploited by the Baltimore and Ohio Railroad Company. Many interesting reminiscences are to be heard from men now grown rich and occupying high positions in commercial life. Some of the despatches that came over the Western Union from the West and were forwarded to Washington were relayed several times on the way from the Southwest to the capital. Wires were worked in short sections in those days and New York did not work further west than Troy and later to Albany. One or the other of these relaying points re-sent the messages received from New York and Boston as far west as Buffalo who in turn re-sent them to Cleveland or Cincinnati en route to the west and southwest. One of the Albany operators was Patrick B. Delany, while the Cincinnati force numbered among it George Kennan, the great authority on Russian affairs to-day, and the late Levi C. Weir, for many years president of the Adams Express Company, who began his business career in 1860 as a messenger in the telegraph office at Bridgeport, Conn. Another notable connected with the Cincinnati office, during the last days of the war, was Thomas A. Edison. He was a mere youth of seventeen or eighteen years and not a finished operator. But before he was twenty he had mastered the telegraphic art and ranked with Kennan, Weir and George Everett, three of the most conspicious telegraph operators west of New York.

In front of the old telegraph building passers-by would often assemble in small and respectful groups to view Professor Samuel F. B. Morse standing on the steps awaiting the coming of a Broadway omnibus. He was quite a hero, his in-

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vention being less than quarter of a century old at that time and he a most distinguished looking man—tall and slender, with a long white beard that covered his face completely. To those of the present day he is a dim and almost nebulous figure like Webster, Clay, Calhoun, Irving, Rufus Choate and other men of their day, but in the early years of the civil war it was generally known that he had been a professor in the New York University, that he ranked with the best painters of his time, and that he had made the first Daguerre portrait, the predecessor of the ambrotype and carte de visite which have led to the present art of color photography. These early pictures were known all over the world as daguerreotypes in honor of the clever Frenchman with whom they originated. Though soon superseded by portraits simpler in process and much less costly of production they were the first sun pictures ever made and it is an interesting fact that Morse actually made these pictures, in New York, before the inventor of the process had succeeded in making any in France. Thus it was that thousands knew Professor Morse by sight and were glad to do him reverence whenever an opportunity offered. He died in 1872, one of the greatest men, if not the very greatest man, the world produced in the eighteenth century.

Distinguished Graduates from the Helena, Mont., Western Union Office.

Ten or fifteen years bring great changes in the personnel of large telegraph offices. Some of the members climb the ladder of business success; a few remain at the bottom and others drop out of the race entirely.

The Helena, Mont., office has an enviable record of graduating a large proportion of brilliant and capable men. An official of one of the telegraph companies recently informed us that it was a matter of great pleasure and satisfaction to him to look back to fifteen years ago to the make-up of the Helena, Western Union operating force. The following were members thereof: W. N. Fashbaugh, now engineer of traffic, Western Union Telegraph Company, New York; Charles H. Gaunt, general superintendent, Pacific Division, Western Union Telegraph Company, San Franscisco, Cal., Charles E. Davies, manager and supervisor of equipment, Great Northwestern Telegraph Company, Ottawa, Ont., J. W. Reed, superintendent, Western Union Telegraph Company, Philadelphia, Pa., James Swan, superintendent, Western Union Telegraph Company, Minneapolis, Minn., (lately deceased) W. P. S. Hawk, superintendent, Postal Telegraph-Cable Company, Chicago; J. G. Davies, manager, Western Union Telegraph Company, Vancouver, B. C., now in the real estate business at that place, and B. D. Snyder of the Postal Telegraph-Cable Company of Texas, Dallas, Tex. These constituted probably three fourths the entire force of the office at that time, and such a record for one office should be a matter of pride to all concerned. The remaining members of the force probably achieved prominence but no record of their subsequent careers is available.

Outside of Helena, Montana developed many notable men. Mr. L. Lemon, formerly at Glendive, Mont., is now division superintendent of the Postal Telegraph-Cable Company, New York.

In those days Mr. E. J. Nally was assistant superintendent of the Western Union covering Montana, with headquarters at Minneapolis, Minn. He is now vice-president and general manager of the Postal Telegraph-Cable Company, New York. Mr. Isaac McMichael was the superintendent of that division at the time. He later became vice-president and general manager of the Great Northwestern Telegraph Company at Toronto. Mr. R. H. Weiny was at the same time an electrician for the Northern Pacific in that section. He afterwards became a prominent electrical engineer and inventor. He died in New York in 1903. Several gentlemen who occupied positions in the railroad service in Montana now fill important official positions on various railroad systems in the country. Mr. L. Horton, Jr., who was also located at Helena, afterwards became superintendent of telegraph of the Philadelphia & Reading system in the east. He is the inventor of the Horton repeater.

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.

Many subscribers find some one special article in TELEGRAPH AND TELEPHONE AGE alone worth more to them than the subscription price of the paper which is $2 per year.

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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's "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.

(*Continued.*)

What advantage has the Toye repeater over the Milliken repeater?

What kind of instruments are used for the Toye repeater?

How many local batteries does the Toye repeater require and how many are necessary for the Milliken repeater?

What advantage does the Milliken repeater possess over other repeaters?

What are the resistances, or rheostats, used for in connection with the Toye repeater?

Name the two drawbacks of this repeater.

In the operation of this repeater what is the objection to keeping the batteries on constantly closed circuit?

Why did duplex and quadruplex apparatus displace automatic repeaters to some extent?

Describe how a duplex or quadruplex set repeats into another duplex or quadruplex set without the use of regular automatic repeaters.

What functions do the polar and neutral relays of the receiving set perform with reference to the transmitters of the opposite set?

Is it necessary that the No. 1 relay shall repeat into the No. 2 side of the opposite set, and the No. 2 relay into the No. 1 side?

What is the advantage of crossing from one side to the other?

Does the combination of a quadruplex and single circuit require a repeater?

At what point in the combined circuit are such repeaters located?

What is the name of one of the first repeaters used for this purpose?

Describe the operation of the Waterbury repeater and trace the circuits on the diagram on page 103.

What instrument does the neutral relay control at the repeating station?

Why does the Waterbury repeater work better in good weather than in stormy weather?

What is the effect of too much pull of the relay spring?

Could the repeating be done by one-half of a Milliken or Toye repeater instead of the Waterbury repeater?

How are quadruplex circuits divided between two firms?

In such cases where is the quadruplex set located?

What is the wire that runs from the quadruplex set to the broker office called?

Describe the Downer repeater shown on page 106.

What is the advantage of the Downer arrangement?

The Military Telegraphers' Pension Bill.

Mr. Charles P. Bruch, president of the Magnetic Club, New York, has received a communication relative to congressional action on the question of pensioning United States military telegraphers.

At the recent dinner of the club, president Bruch, in introducing Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, referred to the matter as follows:

"At the outbreak of the war of the rebellion the inadequacy of the old-fashioned methods then used by the Signal Corps of the United States Army was soon realized, and the government promptly turned to the then new Morse telegraph for aid in directing the movements of its armies and the quick transmission of communications necessary in the conduct of the war. In a very short time—almost instantaneously—a large number of expert telegraphers were brought together and organized as a military telegraph corps, working under the direction of men commissioned by President Lincoln and Secretary of War Stanton as officers in the army of the United States.

"Although the invaluable services rendered by the military telegraphers were appreciated by Lincoln, Stanton and Grant, and by the army commanders, it is almost a crying shame that the government has neglected, so far, to give the members of the corps adequate recognition, and to express appreciation.

"But telegraph men, who can realize the dangers, hardships and difficulties surmounted by the military telegraphers during the war, fully appreciate their patriotism, self-sacrifice and devotion to duty, and the value of the work that was accomplished by them."

Telegraphers without exception—former and present—and thousands of others outside of the telegraph ranks who are familiar with the work of the war telegraphers, will hail with delight any favorable action that Congress may take in the matter, and all should unite in petitioning Congress to make suitable recognition of the work of the military telegraphers of the Civil War.

Mr. C. H. Mulford, manager of the Western Union Telegraph office at Newark, N. J., in renewing his subscription writes: "The AGE is just as much a necessity as my daily paper."

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Rubber Insulation*.

Rubber, the unique vegetable product, for which no full substitute has ever been found, makes an unsurpassed dielectric when properly treated, by reason of its insulating qualities, extreme flexibility and imperviousness to moisture. Crude rubber varies widely in its characteristics and value, depending on its age, purity, and to some extent, the locality in which it is produced. It comes on the market mixed mainly with impurities, such as bark, clay and other foreign substances which are removed by washing and manipulation, resulting in a reduction in weight of from ten to fifty per cent., the finest Para rubber losing about eighteen per cent.

Rubber used as insulation is adulterated or degraded with various substances, so that the compound contains at most, only forty per cent of pure rubber, more usually about thirty per cent in the highest grade insulation down to five or ten per cent in the poorer rubber-covered wires, with no rubber in some cheap insulations which are called rubber.

Pure rubber is valueless for insulating purposes being too soft, hygroscopic, and readily oxidizable. When proper foreign substances to the extent of about sixty per cent or more, including about three per cent of sulphur, are added and the compound vulcanized by heating to from 250 to 300° F., the rubber is made stable, tough and durable, its value as a dielectric depending upon the details of this treatment. The exact temperature and duration of time necessary for vulcanizing depends on the grade of rubber, the ingredients used, and the percentage of sulphur added to the compound. The adulterants most commonly used for making the better grade rubber compounds are dry mineral matter or reclaimed rubber; the composition of the particular material used for compounding, may, in many cases, be left to the discretion of the manufacturer. Proper vulcanization is as important in producing high-grade insulation as the quality of the rubber used or the method of compounding. The amount of free sulphur left in the compound changes with oxidization. In no case should the free sulphur exceed about one per cent—the amount being determinable from the acetone extract—as an excess shortens the life of the rubber. Sulphur gives an indication of the quality of the rubber used, because much sulphur is required to vulcanize poor rubber and a large amount of combined sulphur may be taken as an indication that it was required in order to produce vulcanization.

The best rubber comes from South America, and is known as Para. Weber states that the reason for the inferiority of the African rubber is generally due to the presence of albuminous substances which are not removed by washing and which result in a brittle insulation; he also states that light will oxidize rubber, the more rapidly the less the degree of vulcanization. While a compound containing thirty to thirty-five per cent "old up-river" Para rubber is generally accepted as the requirement for insulation to be used in high-tension work; as a matter of fact, it is almost impossible for any chemist to ascertain, after vulcanization, just what the constituents of the insulation may be, and while any number of tests have been proposed, it is much better to rely on the standing and integrity of the manufacturer and his guarantees than to do business with unreliable firms, expecting to prove from an examination of the product furnished whether or not they are fulfilling contract specifications. While thirty per cent Para seems to insure high-grade insulation, it is beyond controversy that certain compounds containing less than thirty per cent Para give most satisfactory results in service, although they fail to meet some of the tests as to the requirements for the best insulation.

High-grade rubber is not only very elastic but possesses great tensile strength. If over-vulcanized it will break; if under-vulcanized it is not elastic, so that strength and elasticity are fair indications of its value as an insulating material. Those best informed agree that a new sample of thirty to thirty-five per cent Para compound properly vulcanized, should be capable of withstanding a tension of 700 to 800 pounds per square inch before breaking, and when stretched from two to three times its original length should return to within at least 125 per cent of its original length, when at a temperature of about 100° F. Although insulation containing appreciably less than thirty per cent of Para, with additional amounts of cheaper rubber, making a total of say, forty to fifty per cent may pass the tensile and elastic tests mentioned, such test usually indicates that the insulation contains only rubber, and no shoddy or bituminous products; but some authorities claim that a compound containing only Para will have considerably greater resistance to puncture than insulations containing the same proportion of Para with a proportion of inferior rubber in the materials used in compounding.

For the larger proportion of cables manufactured, namely, those used for low tension work, say under 5,000 volts, 30 per cent pure Para is unnecessary, the cheaper grades, as high-grade Ceylon, Malay or African Lapori; for example, giving very satisfactory results for this particular class of low-voltage work, while even the rubber produced from the Mexican guayule is used for the insulation of telephone wires.

The quality and life of rubber insulation has heretofore generally been considered as indicated by the amount of resinous or extractive matter it contained. A high percentage of resinous matter, say fifteen to twenty per cent, was taken to indicate a cheaper and poorer grade of rubber, whereas a low percentage, one to two per cent, was assumed to be found only in the best grade of Para, which comes from South America.

Owing to some unknown cause, the amount of

*From "High-Tension Underground Electric Cables," by Henry Floy.

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extractive matter increases largely in the working and mastication of the gum, there being still further increase during vulcanization. The amount of resinous matter is determined by digesting the gum in acetone, which dissolves out the extractive matter. Standard practice specifies that the acetone extraction shall be carried on for five hours in a Soxhlet extractor, as improved by Dr. C. O. Weber. It is important that care be taken in making the tests, not only that proper conditions should be observed, but that the duration of the test is as specified, otherwise the results may vary widely. As an example of this, it may be stated that in a given instance, a forty per cent Para rubber compound, such as used by the United States Government, if heated for a period of about twelve hours, to 220° F. in a drying oven prior to being treated with acetone resulted in increasing the weight of the acetone extract from two per cent to eight and one-quarter per cent. The greater part of this increase took place during the first few hours of heating. In the same way, the longer an acetone test is continued the larger the percentage of extract obtained, although by far the greater proportion is given off during the first five hours. From this, the necessity of properly conducting and carefully timing the length of the test will be recognized. The rubber to be tested should first be dried over calcium chloride in a vacuum at slightly elevated temperature, and then treated with acetone in the extractor.

It should be understood that the acetone test determines the quality of the rubber compound, so that the usual maximum percentage limit of five per cent, for example, must be raised provided it is intended that the manufacturer shall be permitted to introduce other substances in the adulterant used for compounding, which in themselves contain extractive matter. If it is clearly stated in the specifications that only Para rubber to a definite percentage is to be used and that the remainder of the compound is to be of some other material than rubber, then the five per cent should not be exceeded.

There exists a wide difference of opinion and practice as to the proper limit of extractive matter that should be permitted in a high-grade compound. Some specifications require that the acetone extract should not exceed three and one-half per cent by weight, of the gum in the compound, while the more usual specification and that issued by the rubber manufacturers, sets the upper limit of extractive matter, as five per cent by weight, of the total compound that is, in a thirty per cent Para compound, the weight of extractive matter shall not exceed about seventeen per cent of the weight of the gum. More recent experience and research has shown that some African rubber gum may contain as low as two to three per cent of extractive matter, while some high-grade Para, giving excellent results in service, will contain over four per cent of such matter. With these wide variations and with the knowledge that by proper treatment the amount of acetone in a compound can be reduced to even two or three per cent if necessary, the value of the acetone test is being discredited and abandoned by many engineers—for example, the Specifications for Electric Wires and Cables, issued by the Navy Department, omit all acetone tests whatever, depending upon other tests entirely to determine the value of the compound.

The introduction into rubber compounds of waxy ingredients such as paraffine, for the purpose of increasing megohm measurements, etc., should be limited; a small amount, say three to four per cent of the weight of the rubber gum will not prove injurious.

In America the rubber compound is applied to a conductor in either of two ways:

(a) By passing the conductor through a press similar to a lead machine and applying the compound in a plastic state at relatively high temperature as a seamless tube, as the conductor passes out of the machine. This is called "spewing," and is used more particularly with smaller sized conductors.

(b) By applying the insulation in a longitudinal strip by means of a machine which folds the compound around the conductor and unites the edges in a continuous and almost invisible seam. As judged from practical results, the strip insulation seems about as satisfactory and reliable as the seamless insulation, and it has the further advantage of keeping the conductor properly centered and having imperfections in one layer covered by additional layers.

In Europe the insulation of conductors by winding with rubber tape has been successfully accomplished. This method should be expected to result in a more uniform dielectric capable of withstanding greater potential stress, for a given thickness, than when applied by "spewing" or in strips.

With any method of applying the compound, a braid or tape over all is employed t obetter hold the compound in position and prevent its swelling and becoming porous during vulcanization; such tape has no particular value as a dielectric.

Rubber insulated underground cables are usually covered with a lead sheath both for mechanical protection and to guard against attacks from oils, acids or oxidization. The substitution of a fibrous covering served with a bituminous compound or something of that sort, has been attempted in place of the lead sheath and is said to be found as satisfactory under some conditions particularly where electrolysis cannot be avoided, although such substitution is ordinarily based primarily on considerations of cost.

When completed the rubber insulated cable is the most flexible of all, and should be capable of being bent on a radius equal to five times its diameter, bent similarly in a reverse direction; have the process repeated three times and then withstand puncture and ohmic tests.

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Proposed Monument to James D. Reid.

At the fall dinner of the Magnetic Club in New York, November 15, president C. P. Bruch called attention to the fact that the grave of the late James Douglas Reid, in Mt. Hope Cemetery, Rochester, N. Y., is marked only by a very simple stone bearing his name. He pointed out that Mr. Reid was the first superintendent of telegraph; the employer of many boys who in later years attained great success and prominence in the telegraph and other lines of business; the first employer of women in the telegraph service; that he was a friend and contemporary of Morse; one of the organizers and first president of the Telegraphers' Mutual Benefit Association, and one of the organizers of the Old Time Telegraphers' and Historical Association, and at one time its president; that he was actively interested in and identified with many other organizations and movements for the benefit of telegraphers, and with various charitable and religious bodies; that he was the author of the only history of the telegraph as yet published; and that he was the founder and editor of the first electrical paper in the world. Mr. Bruch suggested that Mr. Reid's services to the telegraph, his friendship for telegraphers, his helpfulness to all with whom he came in contact, and his gentle, lovable character that endeared him to everyone who knew him, entitled him to a more suitable and lasting monument than now marks his grave, and expressed the opinion that it is the duty of the telegraph associations, and of the telegraph fraternity at large, to co-operate in erecting a monument to his memory.

Pursuant to this suggestion, the meeting adopted a resolution directing the officers of the Magnetic Club to communicate with the officers of the various telegraph associations, requesting the co-operation of those associations in a movement to raise the necessary funds and erect a suitable monument, or other form of memorial.

In accordance with this resolution a letter embodying these facts and suggestions has been sent by Mr. Bruch to the presidents of the various telegraph organizations as follows: Mr. Belvidere Brooks, Telegraphers' Mutual Benefit Association, New York; Mr. A. G. Saylor, Serial Building Loan & Savings Institution, New York; Hon. W. S. Jordan, Old Time Telegraphers' and Historical Association, Jacksonville, Fla.; Col. Wm. Bender Wilson, Society of the United States Military Telegraph Corps, Holmesburg, Philadelphia, Pa.; Mr. R. J. Marrin, New York Telegraphers' Aid Society, New York; Mr. W. J. Dealy, Gold & Stock Life Insurance Association, New York; Mr. J. B. Van Every, The Morse Club, New York; Mr. G. A. Cellar, Association of Railway Telegraph Superintendents, Pittsburg, Pa., and Mr. W. C. Daviet, The Magnetic Club of Atlanta, Atlanta, Ga.

Mr. Bruch suggested that each association cooperating appoint two of its members residing in (or in the vicinity of) New York to serve as members of a committee to organize and carry on the work of collecting funds and arranging for the design, construction and dedication of a monument, or other memorial, if for any reason it is found to be impracticable to erect a monument.

Col. Wm. Bender Wilson, Holmesburg, Philadelphia, Pa., president of the Society of the United States Military Telegraph Corps, has appointed Messrs. David Homer Bates of New York, and Charles Almerin Tinker, of Brooklyn, N. Y., to represent the society on the joint committee to arrange for a memorial to J. D. Reid.

Messrs. Thomas M. Brennan and Robt. J. Marrin have been appointed to represent the New York Telegraphers' Aid Society on the committee.

New York Telegraphers' Aid Society.

President R. J. Marrin extends his sincere thanks to the members of the Aid Society and their friends, also to the officials of the Western Union and Postal Telegraph-Cable companies, including Mr. J. F. Zeiss, and the officers, chairmen and members of the various committees, who labored so hard to make the annual entertainment and reception for the benefit of the Relief Fund such a great success financially, socially and otherwise.

He also thanks the New York and Brooklyn newspapers which devoted so much space in their columns to the society's interests. "This," he says, "is one of the finest annual affairs held at Terrace Garden, and reflects great credit on the members of the New York Telegraphers' Aid Society.

"It is a pleasure for me, I can assure you," he adds, "to labor in your behalf when such a vast assemblage turns out to crown my efforts, and it is my heartfelt wish that our members will increase to such proportions that Madison Square Garden will be required to hold us in the near future."

Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Company, New York, has contributed, through Mr. E. J. Nally, vice-president and general manager, $100 toward the relief fund of the New York Telegraphers' Aid Society.

Novel Jail.—The jail of Gerlach, Cal., consists of a telegraph pole. Offenders are chained to the pole and left to serve their terms of imprisonment (?). The pole is marked "Gerlach City Jail." Gerlach is to have a new portable steel jail, however, to take the place of the open-air affair.

Mr. Frank N. Dowler, many years ago identified with the telegraph service but of late years a railroad official in New York, in renewing his subscription, writes: "I take great pleasure in sending you herewith my check for TELEGRAPH AND TELEPHONE AGE for 1912. I also deem it a pleasure to recommend your paper to any persons I think ought to have their names on your subscription list."

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The Railroad.

Mr. C. H. Hubbell has been appointed superintendent of telegraph of the Chicago, Rock Island & Pacific Railway, Chicago, vice J. G. Jennings, deceased.

Telephone Train Dispatching on the Canadian Pacific.—Mr. James Kent, manager of the Canadian Pacific Telegraphs, Montreal, Can., states that there is no truth in the dispatch from St. John, N. B., that the Canadian Pacific Railway will abandon the telephone dispatching system at present established on any part of its lines. The system is said to have proved such an unqualified success in every part of the four thousand miles now equipped that a number of additional telephone circuits will be installed during the coming year.

Lake Shore to Install Telephones for Message Service.—The Lake Shore and Michigan Southern Railroad, E. C. Keenan, superintendent of telegraph, Cleveland, Ohio, is preparing to install telephones in order to open message circuits on two of its divisions, and has recently placed an order with the Western Electric Company for the apparatus. The circuits will extend from Toledo, Ohio, to Elkhart, Ind., a distance of approximately 145 miles, and from Fort Wayne, Ind., to Jackson, Mich., a distance of about 100 miles. Thirty-three selector stations will be equipped on the first named division and twenty-two on the latter.

C. J. Steinel, Superintendent of Telegraph, San Pedro, Los Angeles and Salt Lake Railroad.

Mr. Conrad J. Steinel, whose appointment as superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad at Los Angeles, Cal., was announced in our issue for December 1, was born in Milwaukee, Wis., July 3, 1869. On September 1, 1882, he began his telegraphic career as messenger for the Western Union Telegraph Company at St. Joseph, Mo. Later he took up railroad work and became an operator on the Burlington road and afterwards train dispatcher. He was train dispatcher on the San Pedro, Los Angeles and Salt Lake Railroad for a time, and then received the appointment as chief clerk to the late Isaac T. Dyer, superintendent of telegraph of that road, to fill which position Mr. Steinel has recently been appointed.

Mr. Pettengill on the Railway Situation.

Brief reference was made in our issue for December 1 to the banquet of the Railway Business Association in New York at which Mr. H. J. Pettengill, president Southwestern Telegraph and Telephone Company, Dallas, Tex., made an address. Mr. Pettengill represented the Commercial Secretaries and Business Men's Association of Texas. In Governor Colquitt's first message to the Texas legislature that official, Mr. Pettengill said, recommended that no law be passed that would frighten away capital or jeopardize the investment of honest money: that the rights of property be recognized whether owned by the people of Texas or of other states. Not a single restrictive law was passed at the last session.

Mr. Pettengill and the association he represented were in entire accord with the aim of the Railway Business Association which is the conciliation of the railroads and the people and to awaken the country to the study of the railway situation.

Telephone Dispatching on Buffalo, Rochester & Pittsburgh.—The Buffalo, Rochester & Pittsburgh Railroad has placed an order with the Western Electric Company for equipment to be used in connection with the introduction of train dispatching by telephone on a part of its system. Two separate train wire circuits will be installed. One will extend from Rochester to East Salamanca, N. Y., a distance of approximately 110 miles, with the dispatcher at Rochester, and the other from Buffalo, N. Y., to East Salamanca, a distance of approximately 65 miles, with the dispatcher at the latter place. Both of these division train wires will enter East Salamanca and provision will be made for establishing through connections between Buffalo and Rochester. A special feature consists of a box to be placed outside of twenty way station buildings, containing equipment which will enable a train crew to get in touch with the dispatcher when the way station is closed at night, and every train on each division will carry a portable telephone set which need merely be connected to the box equipment in order to communicate with the dispatcher.

Our Subscription Contest.

As the time for the closing of the subscription contest draws nigh the activity of our agents is becoming manifest in the large number of new subscriptions sent in. There is time yet for any five of our agents to capture the prizes.

The contest will close at 3 p. m. Thursday, December 21, so that checks can be mailed to the winners of the prizes the same afternoon.

The terms of the contest were given in our issue for September 1. Five prizes, amounting to $100, were offered those of our regularly appointed agents sending in the largest number of new subscriptions during September, October and November and up to December 21. The prizes are as follows: First, $50; second, $25; third, $15, and the fourth and fifth, $5 each. The contest is limited to new subscriptions and renewals only. The total amount of cash received from each agent on this account will decide the contest and in the event of a tie on any one prize, the prize will be divided.

Money must accompany all orders for subscriptions. 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.

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The Economies of Telephone Train Dispatching.

At the joint meeting in Chicago, November 23 and 24 of the Eastern and Western divisions of the Association of Railway Telegraph Superintendents, the discussion of the subject of train operation by telephone brought out some interesting and valuable facts concerning the economies of the method.

Mr. G. A. Cellar, superintendent of telegraph of Pennsylvania Lines West of Pittsburgh, and president of the Association, stated that where telephone dispatching has shown a saving in number of dispatchers and in operators' salaries such economy has been distinctly offset by the increased cost of operation and maintenance of the telephone lines.

Mr. W. C. Walstrum, of the Norfolk & Western, Roanoke, Va., stated that it has cost his road $1.01 per annum per road mile to maintain the telephones, including the wages of maintainers, cost of batteries, etc. They put extra men on who take care of the instruments and line, but not of the poles. A supervisor has charge of all telephone work at a salary of $110 per month. One of the economies mentioned by Mr. Walstrum was that one man at one of his stations is able to handle three dispatching districts by telephone.

Mr. E. A. Chenery, of the Missouri Pacific, St. Louis, Mo., stated that his road has one maintainer on 155 miles who gets $90 per month and expenses while away.

Mr. C. S. Rhoads, of the Cleveland, Cincinnati, St. Louis & Chicago, Indianapolis, Ind., said his 1400 miles of telephone lines have been in service nearly three years, resulting in a substantial decrease in dispatchers, salaries and offices, compared with telegraph operation. Besides saving labor, he declared telephone operation to be much safer, since the sending operator is required to write down the orders as he transmits them, assuring a speed at which the receiving station can follow. The speaker also noted the possibility of simplexing telephone dispatching lines for through Morse operation, gaining a number of additional telegraph circuits. By inter-operation with friendly roads it is thus possible to establish circuits which may become useful in establishing communication around fallen line sections, accidents to poles, etc. Mr. Rhoads said his 1400 miles of lines are taken care of by three inspectors, who receive $65 a month, with unlimited expense accounts, and have the aid of twenty-one linemen. Twenty-one motor cars are in use by these men.

Mr. W. F. Williams, of the Seaboard Air Line, Portsmouth, Va., asserted that the saving effected by telephone operation cannot be expressed on a monetary basis. The figures for his own 1100 miles of lines, he said show a gain of 11 per cent. in train time, in spite of an increase of 14 per cent. in track density.

Mr. J. J. Ross, of the Michigan Central Railroad, Detroit, Mich., declared that the presence of simplexing apparatus on his telephone circuits seemed to clear the lines by discharging static accumulations. Mr. F. H. Van Etten, of the Chicago, Terre Haute & Southern, also recounted his experience.

Electric Club of New England.

The Electric Club of New England held its fourth meeting of the fall series in the Auditorium of the Boston Edison Electric Light Company, on November 23. The efforts of Mr. W. S. Barker, district plant superintendent, Western Union Telegraph Company, in behalf of the club in securing such excellent quarters and the generosity of the Edison Company in the matter were made the subject of resolutions expressing the thanks of the club.

The chief speaker was Mr. A. C. Kaufman, commercial agent, New York. He gave a most forceful outline of the benefits of the three column organization, dwelling particularly on the commercial line of endeavor.

District plant superintendent W. S. Barker gave a brief talk showing the value of club meetings to all concerned in developing new ideas and opening the way to new and better understanding of the various lines of endeavor.

District commercial superintendent C. F. Ames gave a talk upon commercial matters showing how traffic and plant employes as well as commercial can be business getters while strictly attending to their own lines of specialized endeavor.

Manager O. A. Conner of the Boston office followed Mr. Ames, adding a few original observations and Mr. L. D. Wilbourn, district traffic superintendent, spoke on general matters of interest.

Mr. Kaufman was then asked by chief equipment man, Mr. R. W. Hall, to give his views of tickers and clocks as adjuncts to regular service, which he did. Other speakers were Mr. Totman, district supervisor of equipment; Mr. J. B. Rex, general traffic chief; Mr. W. G. Wetmore, district superintendent of traffic, Mr. Cook, of the Gold & Stock telegraph department; Mr. A. J. Thompson, assistant wire chief; Mr. Edward Holden, Mr. William Ryan and C. F. Dolan.

Cash Registers in Telegraph Offices.—The New Zealand post office department, which controls the telegraph service, has installed in the telegraph department of the Wellington general post office a cash register machine for recording and keeping separate the totals of all kinds of telegrams.

The Edison Storage Battery.—Mr. Thomas A. Edison recently celebrated the completion of his storage battery experimentation by entertaining 200 members of the classes of electrical engineering from the Brooklyn Navy Yard, at this factory in Orange, N. J. He spent nine years in perfecting the battery.

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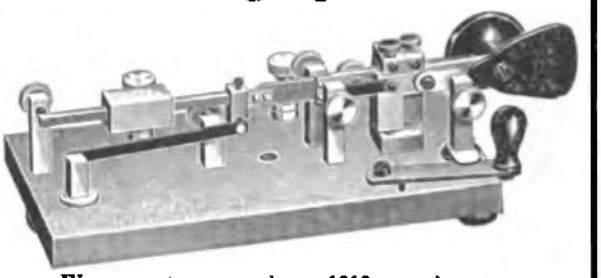

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Fourteen pages are devoted to rules governing the construction and repair of telegraph lines; and four to the subject of standard tools. Submarine cable splices, underground cable splices, single-wire joints and aerial cable splices are also fully treated. Under the general head of Rules for Wiring Offices and Cable Boxes, the subjects of the terminal office, intermediate offices, submarine and underground cables, aerial cables, call circuits and call boxes, leased wire offices, branch offices, miscellaneous, are fully given. Then come rules for the care of motors and generators, explanation of and rules for the care of the Callaud battery, rules for the care of the Leclanche battery and resistance coils, following which is the table of Size and Insulation of Wire Cable for interior use, and that of Wire Gauges.

The nominal price for so large, important and complete a work, embellished with so many first class plates, made especially for it, makes the book a valuable acquisition, indispensable to every telegraph and electrical student. The book contains diagrams of the Phantoplex system, the latest development in the telegraph art. All of the engravings are made from the official blue-prints of the Postal company, and are therefore absolutely correct, and have been produced under the direct supervision of John F. Skirrow, associate electrical engineer.

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Boston Meeting of Western Union Office Managers of Fifth District.

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, and was attended by ninety office managers and commercial employes.

District commercial superintendent C. F. Ames presided and made the opening address. In connection with other matters he recommended that the managers who were not already subscribers to TELEGRAPH AND TELEPHONE AGE, secure copies which were on hand for distribution, and advised that they subscribe for it as there were many items in each edition which would be very helpful to them.

He was followed by district commercial manager Pearson, who gave an interesting talk on "New Ideas" in telegraph solicitations. District commercial manager Chase read a paper covering "Office Management;" Inspector Fitzgibbon spoke on "Messenger Improvements," and Mr. Daniel Sargent, in charge of the telephone arrangement for the district, explained the telephone combination arrangements now in effect in the district. District supervisor of traffic Sollers followed with a paper on "Co-operation of Managers as Applied to Traffic."

At the afternoon session manager Dickinson of Worcester, Mass., made an address on "Office Management," and was followed by manager Shaw of Rutland, Vt., on the subject of "Door-to-Door Solicitation." Mrs. A. L. Faulkner, manager, Holyoke, Mass., gave an interesting paper on "Door-to-Door Solicitation and Distribution of Blanks." Manager Mennealy, of Lewiston, Me., spoke on the subject of "Solicitation at a One-Man Office." Mrs. M. A. Gustavison, Chelsea, Mass., followed with an address on "Solicitation by Lady Managers."

Manager Kelley, of Springfield, Mass., in his paper on "Courtesy" brought out some very good points, and district commercial manager Orr spoke on the subject of "Harmony."

District traffic supervisor Wetmore spoke on the subject of "Commercial and Traffic Department Matters," and general traffic chief J. B. Rex, of the Boston office, read a paper on the "Co-operation of the Boston operating Department with the Field Officers." He was followed by chief solicitor Boothby and solicitor Patterson of the Boston office, who spoke on "Door-to-Door Solicitation," and manager Flanagan of Bangor, Me., gave a short talk on the same subject.

The afternoon session ended with a stereopticon lecture given by district commercial manager Johnson, showing the various means used by the commercial department in getting new business.

A dinner was served at 7 p. m., after which division commercial superintendent E. M. Mulford of New York, gave a very interesting talk on commercial matters pertaining to the division. Commercial agent A. C. Kaufman delivered a fine address on the commercial department's various services, and the getting and retention of telegraph business. District traffic superintendent L. D. Wilbourn gave some helpful suggestions to the commercial department in the matter of handling traffic.

Mr. L. J. Shay, manager of the leased wire service, New England Telephone and Telegraph Company, explained the work of the combination telegraph and telephone offices and telephone matters as pertaining to the telegraph in the district, and was followed by district plant superintendent W. S. Barker, who gave some interesting statistics in a witty address relating to plant matters.

Manager O. A. Conner, of the Boston office, talked on general commercial matters.

In addition to those named the following managers were present: A. D. Davidson, Brockton, Mass.; T. F. Breslin, Fall River, Mass.; F. D. Byrne, Duxbury, Mass.; W. F. McClure, New Bedford, Mass.; W. H. Boyers, Taunton, Mass.; Miss K. G. Leary, Pawtucket, R. I.; P. S. Carey, Providence, R. I.; H. G. Haddon, Woods Hole, Mass.; A. J. Damien, Bellows Falls, Vt.; E. J. Burke, Burlington, Vt.; M. J. Walshe, White River Jct., Vt.; G. E. Marshall, Middlebury, Vt.; R. T. Leddin, Montpelier, Vt.; C. L. Bingham, St. Albans, Vt.; G. H. Batho, No. Adams, Mass.; E. Baudry, Chicopee Falls, Mass.; E. I. Herbert, Augusta, Me.; M. F. Foley, Bar Harbor, Me.; G. H. Cushing, Eastport, Me.; H. H. White, Portland, Me.; W. P. Walsh, Rockland, Me.; Miss E. E. Clay, Waterville, Me.; Miss E. M. Sanborn, Bath, Me.; M. Petit, Calais, Me.; C. E. Somerville, St. Johnsbury, Vt.; J. A. Bardwell, Brattleboro, Vt.; C. J. Abott, Manchester, N. H.; Miss E. G. Wilson, Concord, N. H.; G. H. Wright, Nashua, N. H.; E. M. Fisher, Portsmouth, N. H.; A. D. Allen, Newburyport, Mass.; J. H. Lang, Lynn, Mass.; J. C. Bonner, Gloucester, Mass.; Z. I. Bossonnette, Lowell, Mass.; J. F. Hanrahan, Lawrence, Mass.; C. A. Pearson, Haverhill, Mass.; R M. Bucknam, Waltham, Mass.; Miss M. E. Preston, Fitchburg, Mass.; Mrs. E. E. Dwyer, So. Framingham, Mass.; H. B. Simons, Cambridge, Mass.; J. E. Stroy, Salem, Mass.; F. W. Mihills, Wellesley, Mass.; Miss M. E. Knight, Beverly, Mass.; H. P. Goldthwaite, Dover, N. H.; R. I. Davidson, Peabody, Mass.

New York's Fire Alarm System.—In an article in *McClure's Magazine* for December, under the heading "The Conflagration Hazard in New York," Mr. Arthur E. McFarlane arraigns severely the New York fire alarm system. He says it is "the worst in the United States." It was installed in 1869 and has not been modernized, ninety per cent. of the antiquated equipment being still in use. "It is fundamentally wrong in design," he says, "and is in bad physical condition."

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Postal Telegraph-Cable Company's New Business Office at Boston, Mass.

BY J. P. O'DONOHUE, DIVISION ELECTRICAL ENGINEER, POSTAL TELEGRAPH-CABLE COMPANY, NEW YORK.

The Postal Telegraph-Cable Company has recently enlarged and remodelled its main business office at Boston, Mass., and it now occupies the entire ground floor and basement space of the building at 100 State Street.

The office is thoroughly up to date in equipment and its general appearance is unusually attractive. The ceramic tile flooring in the customer's lobby sets off the beautiful white marble counter to advantage. All the woodwork is finished in mahogany and the office furniture has been carefully selected to harmonize. Ornamental railings, three feet high, fitted with diamond-shaped spindles, are used to separate the different departments instead of the usual high partitions. The effect of this departure

VIEW OF POSTAL OFFICE, BOSTON, MASS.

in office fittings is quite noticeable in the ventilation and natural lighting. The manager's offices are located in the westerly end of the building, with the cashier's department at the easterly end and the call-circuit and delivery departments in the rear. The delivery department is connected with the operating room in the India Building, 84 State St., by two pneumatic tubes. There is also a tube connection between this department and the Commercial Cable Company's main office in the adjoining building.

The call-circuit and time-service equipment have been entirely rearranged and many new features have been introduced which greatly expedite the service.

In the basement are located the motor blowers for pneumatic tubes, supply room, messenger's uniform room and a messenger's lunch room. A shower bath for the boys has been provided, as well as other comforts for them and for the clerical force.

The staff of the Boston office consists of C. A. Richardson, superintendent; F. B. Travis, manager; J. D. McDonald, chief operator; Daniel Carter, traffic chief; L. W. Hoyt and H. L. Vincent, day wire chiefs; J. J. Coen, quadruplex chief; C. W. Lanfair, night wire chief; P. J. Farrell, night traffic chief, and C. B. Parmenter, all-night chief.

The Turner Monument Dedication Postponed.

Owing to the lateness of the season it has been decided to postpone the dedication exercises of the Turner monument until the end of April or the first part of May next year. This action was taken on account of the ground at Harriman (Turner), N. Y., being covered with snow and will likely remain so all winter.

Superintendent C. T. Ford, of the Harriman Estate, of Central Valley, N. Y., who is doing the cutting of the monument has about finished his work and reports having secured an excellent stone. The bronze tablet has also been completed by the Gorham Manufacturing Company at Providence, R. I., and now awaits shipping instructions. Mr. George H. Mills, manager of the Postal Telegraph-Cable Company at Providence, was asked by the committee having the matter in charge to pass upon the tablet. He did so and pronounces it an excellent piece of work. On his suggestion certain changes were made by the Gorham Company in the length of dashes and spaces in the Morse characters on the tablet which give satisfactory results in this regard.

It is announced that Mr. Andrew Carnegie will be present at the unveiling ceremonies, besides other distinguished persons.

It is the general opinion that the committee acted wisely in postponing the date of the unveiling as the wintry weather would likely interfere with the comfort of those who attended and prevent others from making the journey.

The contributions received up to date toward the monument fund are as follows: Previously acknowledged, $1,716.99; David Homer Bates, New York, $10.00. Total, $1,726.99

Improvement in Telephone Wiring.

The Antwerp Telephone Company, Antwerp, Belgium, has recently put on the market a new type of conductor with a view to simplifying and cheapening house telephone wiring.

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To erect the duplex wiring, it is only necessary to drive brads through the webbing. When it is desired to separate the conductors for connecting or other purposes, it is only necessary to cut through the web plate with a roller knife. Each conductor then remains fully lead-sheathed right up to the terminal to which it is attached. Triple and quadruple conductors are arranged in a similar manner.

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LETTERS FROM OUR AGENTS.

ATLANTA, GA., WESTERN UNION.

The first meeting of the season of the Electrical Class was held Friday evening, November 24, with an attendance of twenty-five. The course in technical telegraphy which began in TELEGRAPH AND TELEPHONE AGE October 16, was adopted, and Prof. H. P. Wood, of the Georgia Technical High School, was chosen to teach the class. Chief operator B. F. Ragsdale gave the class an interesting talk, in which he explained the benefits to be derived from such a course, and it was evident throughout the meeting that he intends to keep the class interested and enthusiastic in the work.

The Atlanta office is one of the most modern and up to date in the country. Every effort is put forth by the officials to make the operators comfortable. Commodious rest rooms, well furnished with conveniences, including shower baths, etc., are provided.

The operating force, comprising one hundred and seventy-five operators, as a whole are happy and contented, appreciating fully the liberality of the company in providing for their comfort in every way possible, and appear anxious to carry out the wishes of superintendent E. E. Williams to make the Atlanta office a model in every way. Our record of nearly one million messages per month bespeaks their appreciation.

Mrs. M. P. Norman, the efficient teacher of our telegraph class, may well be proud of her pupils, thirty in number, all of whom are progressing rapidly. Some of her students have qualified for branch office positions and are filling them very creditably. Mrs. Norman is a first-class operator, and works one of our fastest circuits.

NEW YORK POSTAL.

Andrew S. Hunter, aged 40 years, manager of the 30 Church Street office of the Postal Telegraph-Cable Company, New York, died in Brooklyn on December 4.

Mr. R. Jacobs has been appointed manager of the office at 145 East Twenty-third Street.

Mr. E. B. Stanley, formerly manager at 944 Broadway, has been transferred to the 83 Gold Street office, vice W. Scrivens, who has gone to the 944 Broadway office.

Miss A. G. Whalen has been transferred from the 145 East Twenty-third Street office to take charge of the Brevoort Hotel branch office.

Hugh Moffitt, an operator at 253 Broadway, died December 1.

OMAHA WESTERN UNION.—The following officials visited Omaha recently on general company business: Mr. W. C. Titley, division plant superintendent, and Mr. B. L. Brooks, division traffic superintendent, Denver, Col.; Mr. J. J. Welch, district traffic superintendent, Chicago, Ill.

Mr. B. P. Meyers, chief operator at Denver paid Omaha a visit on his way to Kansas City.

C. B. Horton and W. Salisbury, district superintendents, and J. P. Barnhart have returned from a general conference at Denver.

Chief operator J. H. Owens has returned from Kansas City after attending a business meeting there.

Assistant all night wire chief R. M. MacDonald, and Miss Frances Murphy, of the Barclay department, were married November 18.

Mr. F. B. Noyes, who has been manager of the Western Union at Hastings, Neb., for the past ten years says of TELEGRAPH AND TELEPHONE AGE: "It's certainly worth the money," and likes it very much.

PHILADELPHIA, POSTAL.

Mr. L. L. Howell, of New York, was a recent caller on business connected with the company.

Mr. T. N. Powers, chief operator, of Chicago, and H. L. Krum, of New York, inventor of the Krum printer, were recent visitors.

Mr. H. D. Moses is a new arrival.

Mr. A. B. Kurtz has gone to Washington, D. C.

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.

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.

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Great North Western Telegraph Co. of Canada, Geo. D. Perry, purchasing agent, Toronto, Ont.

North American Telegraph Co., H. A. Tuttle, general manager and purchasing agent, Minneapolis, Minn.

Postal Telegraph-Cable Co., Executive Offices, 253 Broadway, New York; purchasing agent, W. D. Francis, 14 Desbrosses St., New York.

Postal Telegraph-Cable Co. of Texas, S. M. English, general manager and purchasing agent, Dallas, Tex.

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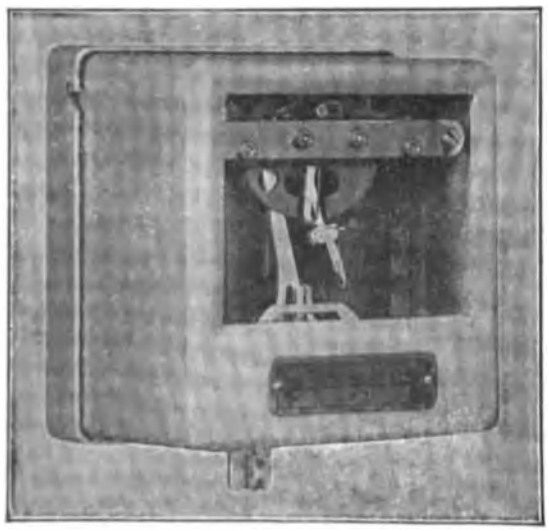

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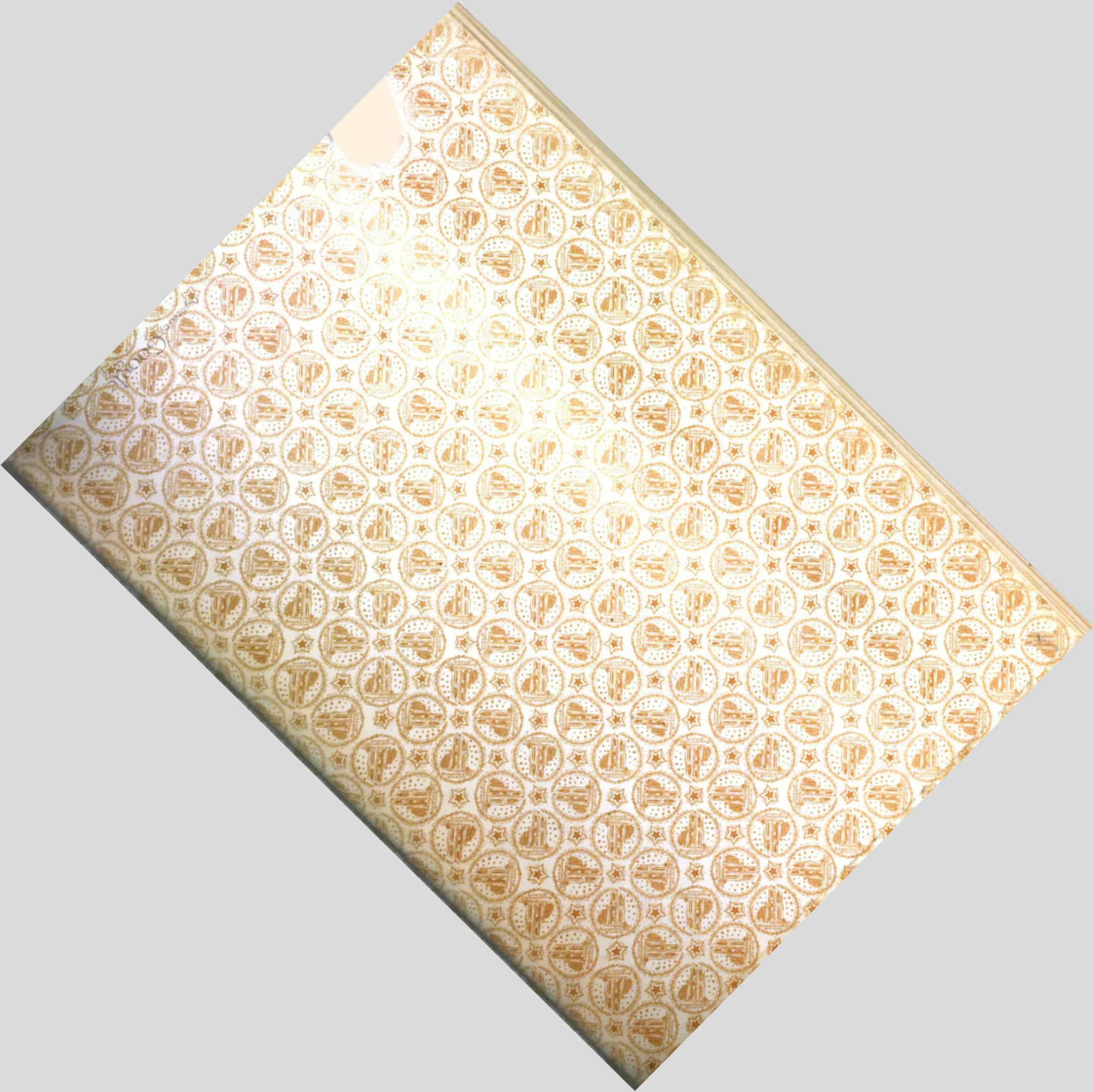

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