TELEGRAPH AGE

A Semi-Monthly Journal Devoted to Land Line Telegraphs, Submarine Cable Interests and Radio-Telegraphy

Office of Publication: 253 BROADWAY, NEW YORK

ESTABLISHED 1883

Single Copies 10 Cents — For Yearly Subscription Rates See Editorial Page

No. 13. NEW YORK, JULY 1, 1909. Whole No. 627.

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TELEGRAPH AGE

No. 13. NEW YORK, JULY 1, 1909. Twenty-sixth Year.

CONTENTS.

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Condenser.

PART III.

In addition to the employment of the condenser for the purposes already stated, it may also be used as a repeater; that is to say, in such a way that it plays a part analogous to that of a repeating device.

Thus, on a simultaneous telegraph-telephone circuit, where a Morse way station happens to be located between the two telephones, if a condenser is connected across the Morse key at such station it will faithfully repeat, or rather reproduce all the telephone impulses in that portion of the wire beyond the open key by means of the successive inductive charges of electricity which the plates acquire. For this reason all Morse stations using a wire in common with a telephone must have a condenser bridged across the contact points of the key. The condenser being open to a direct current, of course, does not permit the flow of the Morse current when such key is open.

ELIMINATING THE SPARK.

The condenser is also used quite extensively for the purpose of eliminating the spark at the contact points, which occurs at the moment a circuit is broken. In order to understand how the condenser accomplishes this feat a few words describing the manner in which a coil of wire in a circuit interferes with the flow of current therein will make the matter clear.

When two or more currents of electricity flow in parallel in close proximity to each other self-induction takes place when one of the circuits is closed and broken rapidly, as happens when an operator is sending; the same being due to the alterations in the value of the current which result. Self-induction in turn creates another current in the coils at such times, the direction of which is the same as the direction the normal current takes at the moment a break occurs and in the opposite direction at the instant the key is again closed. In other words, being in the same direction, it tends to sweep out the original current very rapidly, and as the value of the induced current develops in proportion to the rapidity with which the normal current drops to zero and rises again, the electromotive force of the induced current at break may become very great. The consequence is that it overcomes the resistance of the air gap between the contact points and creates an electric spark.

On the other hand, when the contact is made, the induced current flows in the opposite direction and instead of helping it actually retards the battery current's development. The comparatively slow action of the current under these conditions does not create high induced electromotive forces, consequently there is no spark seen on making the circuit.

Now, the object of a condenser is to diminish the value of the high potential of the induced current at the break. For example, to prevent the sparking of a pole changer connect one of the condenser plates to the bar lever of the pole changer and ground the other terminal of the plates. Under this arrangement the condenser plates absorb a current inductively when the line current is "made." When the break occurs the condenser charge immediately opposes the legitimate current endeavoring to leap the air gap and thus eliminates the spark that otherwise would have followed. In like manner, a condenser connected around the contact points of a relay carrying a strong local battery current, which latter is often required, will reduce the sparking tendency to a minimum and thus enable us to reduce the air space considerably.

In the operation of quadruplex apparatus the less play between the contact points the lever of the pole changer has, the less tendency will there be for it to break over or interfere with the neutral side of the quadruplex circuit.

IN CONNECTION WITH SUBMARINE TELEGRAPHY.

In submarine duplex telegraphy the condenser is used in the capacity of a rheostat or artificial line. As the cable itself is practically one large condenser, a great many ordinary condensers are connected together in series until their total capacity is just equal to that of the cable, after which retarding resistance coils and leaks are added so as to give the artificial line all the characteristics of the "line" or cable itself.

The condenser, it will be seen, has a large sphere of usefulness, as it can be employed in so many different ways and for innumerable purposes.

(Concluded.)

Recent Telegraph Patents.

A patent, No. 923,385, for a telautograph, has been granted to George S. Tiffany, of Summit, N. J. The relays are adjusted conjointly with the movements of the receiving pen.

A patent, No. 923,488, for a printing telegraph, has been issued to H. W. Bull, of Springfield, Mass. Improvements in the transmitting and receiving devices of a printing telegraph.

A patent, No. 923,709, for a rectifier, has been awarded to G. W. Pierce, of Cambridge, Mass., for rectifying alternating-currents for charging storage batteries by using an interrupter and a symmetrically conductive solid in a derived circuit to rectify and distort the alternating current therein.

A patent, No. 924,512, for a telautograph, has been secured by George S. Tiffany, of Summit, N. J. A spring-actuated reel normally tends to wind up the recording paper strip of the receiving instrument and draw it over the writing field, and is retarded by a device comprising two rotative members engaging opposite sides of the paper and normally resisting the movement of it, this retarding device being provided with an escapement controlled by a magnet in the main line circuit.

A patent, No. 924,538, for a telegraphic receiving tape, has been taken out by P. B. Delany, of South Orange, N. J. A chemical tape having projections in arbitrary sequence formed by depressing the face of the tape.

The following patents have expired:

Patent No. 475,938 for telegraphy, held by T. Gothorpe, of Rye, N. Y.

Patent No 476,618, for an apparatus and system for compound telegraphy and telephony, held by F. W. Dunbar, of Newark, N. J.

Personal.

Mr. H. B. Perham, president of the Order of Railroad Telegraphers, was a New York visitor the middle of June.

John A. Townsend, a forty-niner of the telegraph, and for many years manager of the Western Union office at Dunkirk, N. Y., but now retired, celebrated on June 22 the fiftieth anniversary of his marriage. This date was also the anniversary of the birth of Mr. Townsend's wife and son, as well as the anniversary of the marriage of one of his sons.

Mr. Roy W. Howard, general news manager of the United Press, New York, was married in London on June 14 to Miss Margaret Rohe, a well known magazine and newspaper writer of New York.

Mr. H. C. Slemin, sales and advertising manager of the Stromberg-Carlson Telephone Manufacturing Company, was married June 9, at Rochester, N. Y. Mr. Slemin's friends among the electrical fraternity extend their congratulations.

Miss Mabel Cecilia Zeigler, daughter of Mr. Harry Ziegler, of the Postal Telegraph-Cable Company, Augusta, was married on June 29 to Mr. W. H. Kelly, of Savannah, Ga. Mr. Zeigler was a prominent figure in telegraph circles in New York previous to twenty-five years ago. For many years he was located at Savannah and for the past five years has been a resident of Augusta.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. William J. Lloyd, assistant superintendent at Chicago, Ill., has been advanced to the position of superintendent, vice Frederick H. Tubbs, resigned. Both of these gentlemen are well known members of the profession. Mr. Lloyd has been identified with the Chicago office since 1877, when he entered the service of the company at that point as night operator. He successively held the positions of night division chief, night wire chief, night chief operator, manager of the Board of Trade office, chief operator of the main office and finally, in 1889, became assistant superintendent, which position he has since held. Mr. Lloyd was born June 21, 1853, at Buffalo, N. Y., and before entering the service at Chicago was employed by the Illinois and Mississippi Telegraph Company, the Illinois Central Railroad, the Pacific and Atlantic Telegraph Company at Dubuque, Iowa, and the Northwestern Telegraph Company at Milwaukee. From the latter office he was transferred to McGregor, Iowa, as manager of the joint office of the Western Union and Northwestern Telegraph companies, which position he held until he entered the Chicago office.

Mr. A. O. Wallis has been appointed agent of the building, 195 Broadway, New York, vice H. E. Roberts.

Mr. Louis D. Beall, whose appointment as storekeeper in the supply department of the company was announced in our June 16 issue, was born at Hamilton, Ohio, April 1, 1873, and first entered the telegraph service as messenger at Cumminsville, Ohio, in June 1886. Becoming an operator in May, 1888, he served the company in that capacity at Hampton, Roanoke and Petersburg, Va., finally entering the Richmond, Va., office in August, 1891. In June, 1892, Mr. Beall became wire chief of that office, and in

September, 1903, he was again promoted, becoming chief operator. November 1, 1905, he was appointed assistant superintendent at Richmond, which position he held at the time of his recent advancement.

A Barclay printer circuit has been installed between San Francisco and Portland, Ore. A similar circuit will soon be placed in operation between Salt Lake and San Francisco, and also between Denver and Los Angeles, Cal.

RESIGNATIONS AND APPOINTMENTS.

After over twenty years service with the company Mr. A. T. West, manager of the Seatte office, has resigned to engage in the telephone business.

Mr. T. J. Bogan, of Memphis, has been appointed manager at Johnson City, Tenn., vice W. H. Stansell, resigned.

Morse Electric Club Outing.

The outing of the Morse Electric Club, of New York, bids fair to be a most interesting and enjoyable event. It will be held as previously announced at Donnelly's Boulevard Hotel, College Point, L. I., N. Y., Saturday, July 10. The entertainment committee, consisting of P. J. Casey, M. H. Kerner and R. J. Murphy, have been at much pains to prepare an especially attractive program for the pleasure of those who attend, including athletic events and a game of baseball by members. In addition to this, Colonel Clowry, president of the Western Union Telegraph Company, has placed the cable tug "Western Union" at the disposal of the club to convey the guests to and from the point of meeting. The steamer will make two trips, leaving Starin's pier, at the foot of Cortlandt street at one o'clock and at three o'clock. The hotel may also be reached by the College Point ferry at the foot of East 99th street. The following are the officers of the club: J. B. Van Every, president; J. C. Barclay and B. Brooks, vice-presidents; F. J. Scherrer, secretary, and R. J. Murphy, treasurer.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Clarence H. Mackay, president of the company, accompanied by his wife and daughter, returned from his trip to Europe upon the Kronprinz Wilhelm, June 29.

Mr. Edward J. Nally, vice-president and general manager of the company, accompanied by Mr. W. I. Capen, general superintendent of plant, and Mr. H. F. Hawkins, assistant secretary of the company, who has made an extensive trip of inspection going as far as the Pacific Coast and visiting the Western and Rocky Mountain States, will again resume his official duties on July 6.

Mr. E. B. Pillsbury, general superintendent of the Eastern Division, accompanied by Mr. A. L. Edgecomb superintendent at Boston and Mr. W. Ryan general foreman made a recent trip of inspection of the lines in Western Massachusetts.

Mr. Paul C. Bryan, cashier of the company at Dallas, Tex., was married on June 10 to Miss Blanche Alexander of Winchester, Ind.

The Association of the New York Branch Office Managers held its second annual outing at Midland Park, Staten Island, Saturday, June 26, 1909. One hundred and ten persons were present, representing every branch of the service. During the afternoon the following athletic events took place. One hundred-yard run, won by P. Gallagher; running broad jump, won by Jos. McCauley; two hundred-yard run, won by W. P. Brown; one hundred-yard run for fat men, won by Charles Ruffer; obstacle race, won by Jos. McCauley; relay race, won by E. Rhates, W. Gaffney, P. Drexler, and J. Nurnburg; base ball game, Uptown vs. Downtown, won by Uptown manager's team.

After the games dinner was served at which the guests were entertained with singing by Mr. W. Gaffney of the auditor's office, and by two monologists. Short addresses were made by Superintendent C. F. Leonard, Manager J. J. Cochrane and Cashier E. S. Butterfield. Mr. J. F. McNeil acted as toastmaster. In spite of the intense heat the occasion was enjoyed by all who attended. The officers who had charge of the affair were: J. F. McNeill, chairman; W. Finley secretary, and J. A. Manning, treasurer, assisted by Mr. E. P. Tully of the messenger department.

RESIGNATIONS AND APPOINTMENTS.

Mr. E. F. Page, of the Western Union office at Middleboro, Mass., has been appointed assistant manager and wire chief of this company, at Olean, N. Y.

Mr. W. Scrivens, manager of the office at 83 Gold Street, New York, has been appointed to the managership of the office at 228 Pearl Street, vice H. Yeo, resigned.

The Cable.

Mr. L. A. Lurienne, general manager in New York, of the French Cable Company, has gone to Europe on a leave of absence. Mr. E. C. Sweeney, superintendent of the company, attends to the duties of Mr. Lurienne's position while he is abroad.

An important insurance, amounting to £185,000, was recently completed at Lloyd's in connection with the laying of 300 miles of cable from Newfoundland to join an existing Atlantic cable, of the Commercial Cable Company, and from Newfoundland to New York. The cable-steamer Colonia, belonging to the Telegraph Construction and Maintenance Company, Limited, will shortly be despatched from the Thames for the purpose. The total liability of underwriters in this venture exceeds £300,000, as the hull and machinery of the Colonia have been insured. As soon as submarine operations are commenced

the responsibility of underwriters on the cable diminishes in the exact ratio as the cable is expended. As compared with ordinary marine insurance risks, those on cable are regarded as representing the highest class of insurance, as accidents are of very rare occurrence and the cable laying business, on the whole, has shown a very successful record.

The April number of the Electron, the official monthly publication of Siemens' Institute, Stafford, England, contains a very interesting paper by Mr. Frank Allinson upon the work of the noted cable steamship "Faraday." This craft which was built in 1874 is still in active service and undoubtedly has the record for the largest amount of cable laid by one ship having laid over 31,000 nautical miles, which length includes seven Atlantic cables. Mr. Allinson who is an officer on this ship gives a very good description of the apparatus used in cable laying and also in making repairs, together with some interesting reminiscences of remarkable cable laying expeditions engaged in by this famous vessel.

Cable communication is interrupted June 29 with:

Madura Island (Dutch East Indies) Feb. 3, 1908
Demerara June 19, 1909

Canadian Pacific Railway Company's Telegraph.

Mr. John McMillan, superintendent of this company at Calgary, Alb., accompanied by his wife, was a recent Montreal and New York visitor, visiting these places after attending the Detroit Convention of the Association of Railway Telegraph Superintendents. While in New York, Mr. McMillan called upon many of his old friends.

Mr. R. N. Young, assistant superintendent at Winnipeg, Man., accompanied by his wife, visited Montreal and other eastern points recently after attending the Detroit Convention.

Municipal Electricians.

The committee of arrangements which is preparing for the fourteenth annual convention of the International Association of Municipal Electricians which meets at Atlantic City, N. J., September 14, 15 and 16, is hopeful that there will be numerous exhibits shown and believe that it would be profitable for the supply men to make displays, as more and more city electricians are becoming inspectors every day. Mr. A. C. Farrand, Atlantic City, chairman of the committee, announces that there will be a large parlor reserved for the use of the supply men immediately adjoining the convention hall in Young's Hotel. Mr. Frank P. Foster, of Corning, N. Y., is secretary of the association.

A patent, No. 923,114, for a fire-alarm telegraph apparatus, has been granted to F. W. Cole, of Newton, Mass. A signal box, with circuits for transmitting a drill signal and a fire-alarm signal.

Radio-Telegraphy.

The latest list of the wireless telegraph stations of the world, compiled by the Bureau of Equipment of the Navy Department, gives a total of 782 shore and floating stations.

During recent wireless telephone tests conducted by the French navy it is claimed that conversation was successfully carried on between a shore station and a ship one hundred miles at sea.

It is reported that communication has been established by wireless between Viborg, in Finland, St. Petersburg, and Sebastopol in Crimea, the distance in the latter case being 1,000 miles.

Mr. R. H. Armstrong, a telegrapher of Spokane, Wash., has suggested the advisability of sending out wireless C. Q. D. signals when forest fires break out. It is stated that this would be a solution of the problem of scientific fire fighting in the timber regions of the Northwest.

The United States Signal Corps is making preparations for extensive tests of wireless telephony at Washington between the roof of the Mills Building in that city and outlying points, the recent success of the French naval experiments having awakened renewed interest in this branch of the wireless art.

A patent, No. 921,930, for producing amplified current variations, has been secured by E. Weintraub, Schenectady, N. Y., and M. C. A. Latour, of Paris, France. For amplifying current in telephony, telegraphy, particularly wireless, by using a mercury vapor lamp whose resistance varies greatly when the lamp is operated at a voltage less than necessary to maintain an arc.

A patent, No. 923,699, for wireless telegraphy, has been issued to G. W. Pierce of Cambridge, Mass. A tuning apparatus for wireless having a variable inductance coil connected with the antenna and a high-frequency transformer having a variable primary coil in series with the inductance coil.

A patent, No. 923,963, for wireless telegraphy, has been granted to R. A. Fessenden, of Washington, D. C. An apparatus for generating high-frequency oscillations in which the discharge gap is contained in a medium formed of the gases of the argon and helium group.

A patent, No. 923,962, for wireless telegraphy, has been awarded to R. A. Fessenden, of Washington, D. C. For transmitting speech and simultaneously receiving it on the same antenna by means of a commutator adapted to alternately connect the antenna with the receiving and sending devices and having a periodicity above the limits of hearing.

The value of wireless telegraphy on the seas was again demonstrated when the Cunard line steamer, Slavonia, went aground recently on the Flores islands and there was danger that her crew and passengers would be drowned. A "C. Q. D." call was sent out and was picked up first by the German ship, Princess Irene, which was 180 miles away.

This vessel and others within call hastened to the rescue and the 410 passengers and the crew were saved.

A patent, No. 924,168, for a wireless signaling system, has been taken out by Guglielmo Marconi, of London, England. The antenna at the transmitting station is disposed parallel with the surface of the earth, the horizontal position of the antenna being coincident with the line of direction to a receiving station, and means are provided the terminals of which are connected with earth and with an end of the antenna nearer the distant station, for impressing upon the antenna electrical oscillations of high frequency.

A patent, No. 924,560, for a wireless signaling system, has been granted to Guglielmo Marconi, of London, England. An antenna for a wireless signaling system comprises a conductor consisting of two parts supported parallel to the surface of the earth and suitable electrical instruments or apparatus connected between its parts, the length of this conductor being substantially equal to one-fourth, or its multiple, of a wave length of the oscillations impressed upon it, and the conductor being situated in a vertical plane coincident with that passing through a distant station.

The British Admiralty is considering the advisability of decreasing the height of wireless masts upon the ships of the navy from 180 feet to 140 feet as it has been found that ships with masts 180 feet high cannot pass under the Forth bridge. So far as the efficiency of the wireless installation is concerned, the reduction in height is not of so much importance as might at first sight appear. With roof aerials the actual height attained is less important than the mean height of the whole; in other words, the maximum height is less important than the average. The small amount cut off the top of the mast can therefore be to some extent compensated for by giving an increased spread.

Willis L. Moore head of the Weather Bureau has been in London recently attending a meeting of weather forecasting experts from Great Britain, France, Russia and Germany. Mr. Moore's chief recommendation to the meeting was that a plan be adopted to compel every licensed seagoing vessel to carry a wireless telegraph outfit and operator and transmit reports of weather conditions. In this way every vessel would know where storms are, at what rate of speed they are traveling and where they are going.

The Spanish mail steamship Antonio Lopez which in a heavy fog ran aground at about 9:30 P. M., June 9, on the shore off Fire Island, New York, was not equipped with a wireless telegraph outfit and as a result it was eight o'clock the next morning before her predicament had been discovered and a rescuing ship had come to her aid. If she had been equipped with wireless the accident would undoubtedly not have occurred as there was a shore station near the point where the vessel ran aground which would have informed the operator on the ship of the nearness of the shore and thus averted the accident.

Senator Nixon of Nevada, a Former Telegrapher.

George Stuart Nixon, United States Senator from Nevada, is a good example of a former telegrapher, who has made a notable success in business and public life, and shows what can be accomplished by one who takes advantage of every opportunity to increase his knowledge of the methods which go to make a successful career. That Mr. Nixon has made the best possible use of his time is shown by the fact that the story of his success reads more like one taken from a novel than one of real life. Mr. Nixon was born in Placer County, Calif., April 2, 1860, and entered the telegraph service as operator for the Southern Pacific Railway Company at New Castle, Calif., February 1, 1880. He remained in that service, working at different stations in California and Nevada, until January 1, 1885, when he accepted a position in a bank at Reno, Nevada. After two years' service in this institution, during which he acquired a thorough knowledge

SENATOR GEORGE S. NIXON, OF NEVADA

of banking methods, he went to Winnemucca, Nev., and organized the First National Bank of that place, taking the position of cashier, which he held until 1900, when he became president of the bank. Mr. Nixon is also president of the Nixon National Bank of Reno, the largest capitalized bank between Denver and Sacramento, and of the Tonopah Banking Corporation of Tonopah, Nev. His life, prior to his entry into the telegraph service, was spent upon a farm, and he ascribes his success in the business world to the foundation which was laid while he was thus employed. He numbers among his best friends to-day many of his associates of the days when he was a telegrapher, some of whom are engaged in other vocations, but many of whom are still in the service. Mr. Nixon's career in the Senate has been a useful one and reflects honor upon the State that selected him. He is now chairman of the important Committee on Coast Defenses.

Big Four Railway Telephone Train Despatching System.

Between Indianapolis and Cincinnati there has been put in operation a telephone train despatching circuit which stands out as a successful circuit, operating under the most adverse conditions.

The great obstacle to be overcome was induction from the single-phase interurban railway which parallels the line for fifty miles. This line uses 3,300 volts on the trolley and 33,000 volts on the power circuit, single-phase alternating current. The trolley averages about forty feet from the telephone wires for most of the distance, and at Fairland it is within ten feet of them for about one mile.

The experience of others using circuits paralleling single-phase power was that it was not possible to eliminate the induction caused by the trolley. The officials of the Big Four Railway Company decided that if the telephone was to be adopted for train despatching it would be necessary to get successful results when paralleling a single-phase circuit, as it was thought that later many other interurban lines in their territory would adopt single-phase power transmission.

A committee of operating officials inspected various circuits in operation and discussed the subject with many telephone experts. All who were consulted were of the opinion that it would be money

A STATION ALONG THE LINE.

wasted to attempt a telephone circuit in that territory, except the engineers of the Sandwich Electric Company, who agreed to undertake the work of engineering and equipping the circuit and guaranteed its successful operation. They prepared a special scheme of transposition to meet the local conditions, and great interest in the outcome was manifested by those familiar with the difficulties to be overcome. When the wire stringing and transposing was completed and instruments installed it was found to be a perfectly quiet circuit. The instruments used were Sandwich Electric Company's Type 4-D selector, despatcher's call equipment and telephone apparatus. The circuit went into operation May 14 and has completely won the Big Four officials over to telephone train despatching.

DESPATCHER'S OFFICE AT CINCINNATI.

The circuit is one hundred and ten miles in length, sixty-five of which is double track and forty-five single track, and has thirty stations besides the despatcher's office.

A new feature introduced is a cordless jack box, using a double plug, by means of which one telephone is used to connect with either of several circuits without the difficulties incident to the use of plugs with cords. An important adjunct to the apparatus used is that the selector will ring either of two bells at the sub-stations. This feature will care for future requirements when message work is done by telephone.

The circuit enters both the Union Station at Indianapolis and the Grand Central at Cincinnati, at both of which it is the pioneer. The circuit also has the distinction of being the first telephone train-despatching circuit to operate in the state of Indiana.

Plans are already under way for the installation of the system on other divisions of the Big Four.

Mr. E. W. Collins, superintendent of the Postal Telegraph-Cable Company at Cleveland, O., in renewing his subscription to Telegraph Age, has this to say: "Herewith my twenty-sixth subscription and the twenty-fifth renewal. How time flies and what an educational and helpful periodical Telegraph Age has become! More power to it!"

The Main Underground Telegraph System of Great Britain.*

BY MAJOR W. A. J. O'MEARA, OF LONDON.
Engineer-in-Chief of the British Postal Telegraphs.

(Continued from page 405, June 16 issue.)

[In the instalment of this article, which appeared in our June 1 issue, we stated that Figure 1 showed the number of conductors in the original scheme proposed in 1881. This was an error, as the map given shows the system existing or under construction in 1908.—Editor.]

The completion of the Northern underground system between London and Glasgow may be regarded as the first step in our program for the provision of an underground cable system. The second step was the laying of a cable through the west and southwest of England. This is known as the Western cable, and connects up London, Bristol, Exeter, Plymouth, and Penzance, a total distance of 532.8 kilometres. The work has been in progress for the past two years, and the cable has now been laid between London and Bristol, a distance of 192 kilometres. The type of cable adopted for this route deserves some notice, as it is different from either of the four sections yet described.

It is obvious that upon a route which passes through many large cities, and through areas which are widely different in character and in local telegraph traffic requirements, the number of wires will necessarily not be the same throughout. For instance, the number of conductors required in the remoter sections will naturally be less than in the sections nearer London. Between London and Reading, a distance of 67.2 kilometres, 169 conductors are provided in the cable; this number drops to 104 to Bath, which is 109 kilometres farther on. Between Bath and Bristol, a distance of nineteen kilometres, the circuit requirements increase considerably, and the cable contains 162 conductors. Beyond this, to the extreme end of the cable, the number of conductors will be less. It should be observed, however, that notwithstanding this fact, the type of cable is uniform throughout, the only difference being in the number of conductors. The cable is of a composite order, as is the third section of the Northern underground cable previously described, but there is this important difference, that in addition to ordinary twinned pairs of conductors and single-screened conductors there are a number of groups composed of four twisted pairs, forming quadruple cores of eight wires each. The essential difference between this arrangement and the multiple twin core is that, in the latter, two groups of twisted pairs (eight conductors) are twisted together in the manner already described, whereas, with the quadruple-pair core, the four twisted pairs are all twisted together in quadruple form. The arrangement can perhaps be gathered by referring to Figure 4, which shows, diagrammatically, the actual cable laid in the section between Reading and Bath, a distance of 108.8 kilometres.

It will be observed that the more central portion of the cable consists of seven complete quadruple core groups, each group comprising four twisted pairs. Surrounding these are twenty-six single copper-screened conductors, and in the outer layer are shown twenty-two screened conductors. Further particulars of the cable are as follows:

(a) Weight per kilometre of quadruple pair conductors, ...45.4 kilograms.
(b) Weight per kilometre of inner layer of screened conductors .....31.78 kilograms.
(c) Weight per kilometre of outer layer of screened conductors .....90.8 kilograms.
Resistance per kilometre of (a).....5,457 ohms.
Capacity per kilometre of (a)....0.04 microfarad. (wire to wire)
Resistance per kilometre of (b).....7.796 ohms.
Capacity per kilometre of (b).....0.09 microfarad. (wire to earth)
Resistance per kilometre of (c).....2.728 ohms.
Capacity per kilometre of (b)...0.09 microfarad. (wire to earth)

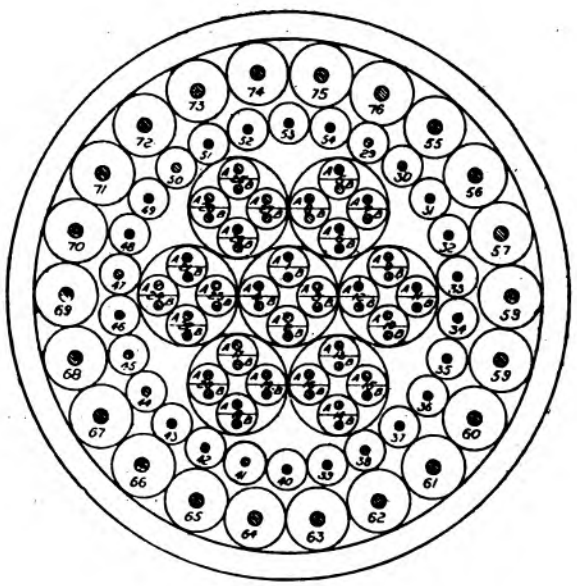

FIGURE 4.

The thickness of the paper insulation is .063 millimetre, and that of the cable sheath 3.81 millimetres. The external diameter of the cable is 7.4168 centimetres.

It should be mentioned that in the case of screened conductors three layers, as a minimum, of insulating paper are required, the first of which is longitudinally and the others spirally wrapped.

The advantages to be secured by the quadruple-pair type of cable are somewhat similar to those offered by the multiple twin. Diagonal pairs in the same quadruple core can be bunched in order to secure increased conductance without a proportional increase in the electrostatic capacity. The provision of additional circuits by superimposing on the loops is also a feature of the cable. In the multiple-twin type of cable the method of

* Paper read at the first International Conference of Telegraph and Telephone Engineers, Budapest, 1908.

successive twinning admits of the bunching of pairs to a greater degree than the quadruple-pair cable; but in actual practice the quadruple-pair type of cable has satisfactorily fulfilled the requirements of bunching.

Paper-insulated cables are subject to the following tests at the manufacturers' works by officers of my department prior to being delivered:

(a) For insulation, resistance, and contact.
(b) For electrostatic capacity between each wire and earth and between the wires of each pair.
(c) For conductor resistance.
(d) To check the relative positions of the wires in the cable.
(e) To ensure that the lead sheath is free from defects.

And finally, the insulating paper is tested for strength before and after drying.

(a) and (b). As it is necessary to ascertain the insulation of each wire from every other wire of the cable, all of the wires which cannot possibly touch each other are grouped together and tested for insulation resistance and wire-to-earth capacity, the remaining wires of the cable being joined to the lead sheath and earthed. The wires forming the cable are divided into as small a number of such groups as is possible, and each group tested with all the other groups earthed. The capacity between the wires of a pair is tested by removing the earth connections from cable and battery.

The average insulation resistance and capacity per mile of wire is then calculated.

A battery of 600 volts is used for the insulation test and one of about sixty volts for the capacity test.

(c). The conductor resistance is measured by means of the Wheatstone Bridge. In making this test all conductors of the same gauge are connected in series, and the average resistance per mile of wire at 60 degrees Fahrenheit is calculated. This test shows whether there are any broken conductors.

(d). This test is taken in order to ascertain whether the wires occupy the same relative positions at each end of the cable, and to ensure that they are in proper sequence. This is done by ringing a bell through each pair, and noting that the pairs are in the specified order. This test is necessary, as pairs sometimes cross one another during manufacture.

(e). The lead sheath is submitted to an internal air pressure of 75 pounds per square inch, and immersed in water for twenty-four hours to ensure that it is free from defects.

The transportation to the site of the work of the whole of the pipes, cables and other material employed in connection with these works has been carried out under local contracts. At the time the main underground works from London to Birmingham were started only horse transportation was available, but when the new type of road motor vehicles began to be employed for trade purposes in this country some five years ago, it was decided to invite tenders for the haulage of cables and other materials by this means from railway stations to the points at which they would be used.

When the question was first considered in connection with a hilly section of the Northern cable it was found that there was a considerable saving in favor of steam traction, and consequently this means was more extensively used afterwards, not only for cable drums, but for all classes of heavy line stores. Later it was calculated that the average cost of steam haulage in the districts where it was used was seventy-three and one-half per cent. of the estimated cost of the same work if done by horse haulage, while the average time occupied was only thirty-one per cent. Steam traction proved especially advantageous and economical in those cases where the stores had to be conveyed over hilly roads.

The experience gained by our administration has resulted in considerable saving being effected as the works have proceeded. In many cases it has been found more economical to accept the maker's quotation for delivery of cables, etc., at their works, and to make separate provision for transportation of the cable to the scene of the work.

The conditions in the districts near London differ largely from those in outlying districts. Cable drums cannot be delivered in bulk and left lying by the roadside until required, as is the case in country districts when large quantities of drums are delivered at one time by mechanical traction. For this reason, and as contractors have usually to guarantee a delivery of only three drums per day, which is sufficient to keep a cabling gang employed, it has not always been found desirable to accept the quotation for mechanical traction in favor of horse traction on account of speed, and consequently the lowest quotation, whether for horse or mechanical traction, is usually accepted. When the question of the amount of cable which can be delivered in a given time becomes a matter of sufficient importance and when the route in question is hilly, mechanical transportation undoubtedly possesses advantages. This was proved in connection with a certain section of the Northern cable, when the cable required was delivered at the rate of from eight to twelve drums per day by mechanical transportation, the empty drums being picked up on the return journey at the same time. Such a rate of delivery would have been more difficult to obtain, and certainly more costly, if horse haulage had been resorted to.

In the early stages of these subterranean works it was considered that there would be some advantage in the telegraph administration possessing suitable vehicles for the transportation of the cable drums from the railway depots to the site of the works. In consequence, a vehicle was specially designed for horse haulage; later, a larger vehicle of the same type was designed suitable for use with steam or petrol engines.

The bodies of these vehicles are hung very low, with a view to facilitating the unloading of the drums on the roadside. They are provided with a specially strong screw brake in addition to a shoe skid. It has not been possible always to employ the special vehicles, and frequently wagons have had to be hired for the transportation of cables from railway depots; in such cases care has been taken to select vehicles having platforms hung low, not only to avoid the risk of accidents from overturning on rough and hilly roads, but also in order to reduce the labor of unloading cable drums at the site of the work. Extemporized gyns have been employed for unloading cables when the width of the road has not been sufficient to enable the drums to be rolled down skids.

The drawing in of the lead-sheathed cable into pipes is carried out to-day practically in the same manner as that adopted in connection with the provision of the first lead-sheathed cable between London and Birmingham. In fact, the only change made has been the introduction of the recently patented wire cable grip, shown in the upper part of Figure 5, by means of which the cables are pulled into the pipes. In the early stages of these works this device was not in existence, and a clip had to be fastened on to the end of the cable by means of two screws, for which holes had to be bored through the lead sheath with a gimlet. The conductors had to be forced out of the way, so as to allow the screws to pass through the cable end. The end of the cable with the clip attached was then immersed in melted paraffin wax, which thoroughly filled the interstices caused by the screws. The pulling-in rope was provided with a link to enable it to be connected with the clip fixed to the cable end. This method of attaching the pulling-in rope to cables has now been entirely abandoned, and the wire cable grip is exclusively employed by the British Telegraph Administration. The device has given entire satisfaction when the necessary care is exercised in attaching the grip to the cable so as to ensure that the end of the cable will not rupture and break away and should by any chance difficulties be encountered during the passage of the cable through the pipes. The grip is so attached that it may have a bearing on the conductors, and this is achieved by driving back the conductors at the end of the cable with a steel punch, so that they tend to form a terminal knot which the grip can clutch. The sheathing is also uniformly thickened by being closely dressed upon the conductors. The mouth of the grip is drawn forward until it tightly fits the cable, and then secured with a tie of prepared tape. When everything is ready for drawing in the cables, the joint holes in the sections are opened, and a mop made of spun yarn is drawn through the pipes to clear them of any grit or water which may have got into them.

The drums containing the cables are placed almost over the joint holes. The cable grip having been fastened to the cable end in the manner described and the pulling-in rope attached thereto, the operation of paying the cable into the pipe is proceeded with. Six men are employed at the cable drum, one of whom takes his place in the joining pit and serves the sheathing freely with petroleum jelly; a second man keeps the cable well out from the drum as it is coiled off, while four men assist in revolving the drum at a convenient speed and keep the layers of cable from getting too slack. Each man carefully examines the lead sheathing as it passes through his hands, to see that there are no visible defects. This examination has brought to light damage in the lead sheath caused by bad packing, and in such cases the defective cable lengths have been returned to the manufacturers. The men handling the cable are provided with felt aprons and also with leather gloves, to reduce the risk of lead poisoning. It is important to avoid the risk of buckling the cable at the mouth of the pipe during the process of drawing in. In order to avoid this danger the cable should describe a curve of large radius after leaving the drum, and enter the pipe in a horizontal position.

In the early days of the employment of lead-sheathed cables petroleum jelly was used only in connection with the larger sizes of cables, the jelly being intended to act simply as a lubricant to facilitate the passage of the cables along the pipes.

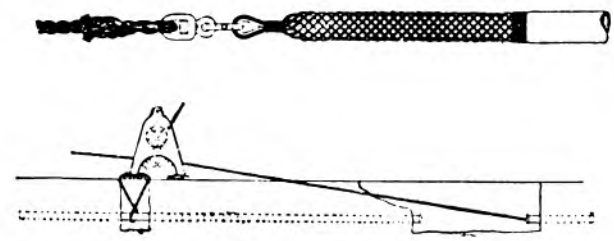

FIGURE 5.

During the past few years it has been definitely ascertained that petroleum jelly very effectively protects the lead from chemical attack by street refuse, which finds its way into the joint boxes and pipes, and it is now the practice to coat all lead-sheathed cables with this jelly.

At the pulling-in end a crab winch is anchored down to the main pipe by means of a rope, as shown in the lower part of Figure 5. Four men usually work the winch, while one or two men hold the rope taut as it comes off the barrel, and another coils the slack rope on to a drum, so as to keep it free from grit and other foreign substances, and to facilitate its transport.

Before the cable grip was introduced the cable end on which the clip had been fitted had to be sawn off when the pulling-in operation was complete, and the open end sealed.

A considerable time has frequently elapsed before the jointers have been available to join up the several cable lengths drawn into pipes. In such cases the two ends of the cables have been carefully laid side by side in the trench and protected by timbers at the two sides and on top. The ground has then been filled in and the surface made good.

During the progress of the underground work to the north it was decided to draw a cable containing seven screened conductors into the pipe laid between Stafford and Warrington, to be available as a temporary measure in the event of interruptions caused by storms. Fortunately it was not necessary to bring these wires into use in this section. This cable remained in the pipes from February to October, 1903, when the permanent cable was then transferred to the pipe line between Manchester and Leeds. As the length of the cable recovered was not quite long enough to bridge the distance between the two towns, eight gutta-percha wires were drawn into the pipe to complete the communication at the Leeds end of this section of the pipe work. This screened cable was required for use after it had been laid between Manchester and Leeds, but, unfortunately, during the process of withdrawal from its first position and the relaying in the second position the copper tape screen had become displaced and had penetrated the paper insulation. In consequence, some trouble was experienced with the temporary circuits established by its means, but this has been overcome and the cable is still in use.

(To be continued.)

Time of Filing Messages in Massachusetts.

The law enacted by the Massachusetts legislature, known as the "filing time bill," which compels telegraph companies to place the time filed and time received on every telegram originating from a point within that commonwealth and destined to another place therein became effective at midnight June 15.

The law reads as follows:

"Sec. 1—Every person, firm, corporation or association engaged in the business of transmitting communications by telegraph in this State and charging tolls therefor, shall cause to appear plainly upon the addressee's copy of every telegram originating at and destined for a point within the commonwealth of Massachusetts, the hour and minute of the day on which it was filed for transmission and the hour and minute of the day of its receipt at its destination.

"Sec. 2—Failure to comply with the provisions of this statute shall be punishable by a fine of not less than $100 nor more than $500 for every telegram in violation of this statute."

The telegraph companies instructed all employes handling traffic to count as extra words, and to charge at the regular rates, the words necessary to convey this information. The circular of instruction issued by the Western Union Telegraph Company reads as follows:

"A law has been enacted in Massachusetts which requires that the delivered copy of every telegram originating at and destined for a point within the commonwealth of Massachusetts shall show conspicuously the hour and minute of the day on which it was filed for transmission and the hour and minute of the day of its receipt at its destination. Therefore, beginning at 12:01 a. m. on the morning of June 16, there shall be added to each message accepted in the city of Boston and destined to a point within the State of Massachusetts the words 'time filed,' followed by the actual time of filing expressed in words. This information will be transmitted as a part of the check and will be counted and charged for. For example, if a message is filed at eleven forty-five a. m. the words 'time filed eleven forty-five a. m.,' will be transmitted as part of the check and will be counted and charged for as extra words. If the body of the message contained ten words, the check will read 'sixteen paid, six extra words.' No charge will be made for placing the words 'time received' and the time on the message after the signature.

"These instructions likewise apply to all messages received over the telephone, whether from regular subscribers of the telephone company or from patrons using the telephone pay stations. Receivers will be very careful, if any objection is made to the charge for extra words, to explain courteously to the patron that they are simply complying with the law and are compelled to observe the same in every instance, or render themselves liable to a fine of not less than $100 for each offense."

The Postal Telegraph-Cable Company also issued similar instructions to its employes.

Representative William H. O'Brien, who introduced the bill into the legislature and fought strenuously for its passage, stated that he considered the action of the companies in charging for the transmission of the filing time a clear evasion of the law.

Mr. O'Brien, who is an old time telegrapher, Mr. M. J. Reidy, another member of the legislature, also a former telegrapher, and a few operators unfriendly to the telegraph interests conceived the view of enacting this legislation to "get even" as it was stated for certain alleged grievances which they had against the companies. These adverse interests were reinforced by many of the newspapers, some of the editors and writers on the same being former telegraphers, and within easy reach and influence. The result has been that the entire population of Massachusetts are put to the expense of paying for extra words in their telegrams covering the filing time, which it is claimed is of absolutely no service to them.

Other influences in the commonwealth were stirred to such an extent that the legislature quickly amended the law to read: "No extra charge shall be made for or on account of the additional words required; provided, however, that nothing in this act shall be construed to abridge the powers of the highway commission conferred by the act of 1906." This is the act giving the highway commission supervision over telephone and telegraph companies as to rates, service, etc.

The bill as amended is now a law and will become operative within a month. It is fair to presume, however, that the telegraph companies will test the validity of the law and that the matter will now be fought out in the courts.

THE INTERNATIONAL CONFERENCE OF TELEGRAPH ENGINEERS AT BUDAPEST.

In an able paper on the new telegraph inventions read at this conference, and published in the Telegraph Age of June 16, it was rightly said that telegraphy has undergone a change since the introduction of the telephone. A universal conviction that telegraphy must be revived is evinced by the increasing interest in the new systems and the discussions of various solutions of the problem.

It is incontestable that it is necessary to increase the carrying capacity of the wires, but we think that any solution which does not stimulate the productive power of the operators will be incomplete. Whether we consider the budget of a government telegraph administration or the balance sheet of a telegraph company, we think the vitality of the service demands that, in both alike, the telegram should be carried for less than the price for which it is sold, and that the administrative policy should be inspired with the enterprise which characterizes industrial activities.

If we understand this discussion, these statements are generally approved, but opinion has not matured as to the means of accomplishing the desired results without too radical a change in existing methods. Perhaps the scope of the remedy to be sought may be clearer if we consider more attentively the condition of first importance in the whole problem, the possibility of reducing the cost of the message.

History has shown that a reduced tariff will lead to an increased traffic. A cost of carrying this traffic profitably must first be assured. By increasing the number of messages carried on the existing wires we may sub-divide the cost of the maintenance of wires per message proportionately. The administrative cost per message need not increase directly in proportion to an increased traffic. But the enormous item of operators' cost, amounting to more than one-third of the entire cost of the telegram, and including, as it does, in the case of 80% of the messages, several repetitions, cannot be neglected; it is only by reducing this item also that we can hope to arrive at a total message cost sufficiently low to be able to sell the telegram at an appreciably lower price. The new inventions are designed to aid in this important particular, by employing a new class of operators, drawn from a wider field, and furnishing them with an instrument more facile of manipulation to enable them to increase their product.

The sustained rate of the operator upon the typewriter transmitter is the highest of any attained in telegraphy, and the work the least fatiguing. The octoplex Rome-Naples, which has been in use for six years, carried 7,000 average telegrams in twenty-four hours daily during the week of the Calabrian earthquake. The operators were young women. Long commercial practice has confirmed the transmitting capacity ascribed to the Rowland System in the tables of M. Hollos, and shown that, with an active traffic, the operators' cost is reduced to one-third of the ordinary cost.

We offer some additional reasons why the new inventions have not been more rapidly put into practice. The powerful systems have never been used continuously at a capacity sufficient to show their economic value; the normal traffic, even on the great lines, at present is not sufficient. Nor has their most efficient operating organization been developed as, by long use, has that of the Morse System. In comparisons of cost it has therefore been impossible to take into account the economics to result from a wider use. The price of such machines also must remain high until they can be made in larger numbers. We shall account for the slowness of their introduction from a general timidity in overcoming the initial difficulties.

If the discussion is not to remain in the academic stage, the ideal telegraph system may only be expected to develop from the use of the new system, now most available as a basis for that development. Every telegraph invention which has attained a general use has been developed from practical use.

THE ROWLAND TELEGRAPHIC COMPANY.

Telegraph Age.

Entered as second-class matter at the New York, N. Y., Post Office.

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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253 BROADWAY, NEW YORK.
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JULY 1, 1909.

The Convention at Detroit.

The twenty-eighth annual convention of the Association of Railway Telegraph Superintendents which occurred at Detroit June 23, 24 and 25, and of which a detailed report appears elsewhere in this issue, has now passed into history along with its twenty-seven predecessors. We believe that the recent convention will be especially remembered as marking a distinct epoch in the revolution which is taking place among the railroads in substituting the telephone for the telegraph for despatching purposes. A year ago business activities were at a low ebb and many of the superintendents were not entirely convinced that the telephone was suitable for their use. Financial conditions are now greatly improved and after such conclusive demonstrations, as have been witnessed, of the utility of the new system none of the superintendents can doubt any longer the value of the telephone for their purposes; in fact, tthe dominant tone of all those expressing themselves at the convention was strongly in favor of adopting the new system as fast as possible. Hence we feel safe in predicting that the next year will see much greater relative activity in the installation of telephone-train despatching systems than the one which has just passed.

The Duties of a Telegraph Official.

Those who imagine that the duties of the officials of a telegraph company lead them along a path of roses and consist chiefly in declaring dividends, would have their eyes opened if they could see all of the difficulties under which these much envied people actually labor in order to make the business yield a profit to the stockholders.

In the first place, they must ever be on the alert to overcome, if possible, the effect upon public sentiment of the utterances of a certain section of the daily press which, always eager to satisfy the demands of its readers who believe that all large corporations are essentially bad, is continually proclaiming in bold faced headings the faults of the existing telegraph system, without a single word in regard to the benefits which the world is continually deriving from its use. If the suggestions of these would-be reformers were all put into practice it is certain that the companies would be bankrupt in a short time. Encouraged by this demonstration in the press of what appears to be strong public sentiment, state and municipal officials decide that if they wish to retain the good will of their constituents, they must do something to curb these great evils which are pointed out so plainly to them, and do not hesitate to pass any measure aiming at this object which the proposer affirms will serve public interests. This they would do without consulting those against whom the statute is directed, and without any thorough investigation of what will be the actual effect of the measure upon the public. In many cases this impromptu legislation works directly to the disadvantage of the people whom it is supposed to benefit.

One instance of this brand of statesmanship is to be found in the ordinances which are constantly being passed in small cities and villages requiring the telegraph companies to place their wires underground. Whenever a person is accidentally killed by contact with an overhead electric wire, the press takes up the incident and decides that any aerial wire is a menace to the safety of the people, and accordingly all wires should be buried. Municipal authorities throughout the country know too that all wires in the largest cities are underground, and as a result the officials of smaller cities, like Worcester, Mass., Davenport, Iowa, Hartford, Conn., Atchison, Kansas, and others still smaller, decide that their city must assume a metropolitan aspect by the removal of all overhead wires. If the telegraph officials did not take steps to point out to these people the fallacy of their reasoning, and thus prevent the enactment of injurious ordinances in such cases, they would soon find themselves confronted with the problem of placing their entire system underground or retiring from business. In many instances the latter course would be the only one which could be adopted, as the business in any but the largest cities is altogether too small to justify them in spending the great amount required to install an underground system. In any case they would have to close some of their branch offices, and thus the public would suffer an inconvenience which those who use the telegraph to any extent would hardly consider compensated for by the improvement in the appearance and alleged safety of their city.

Another condition which has to be met is the attempt which is often made to collect from the companies taxes which it is alleged are due under the working of some ordinance or statute that was en-

acted long ago, and has been a dead letter for years, but is brought to life in order to bleed the telegraph companies of some of their coveted earnings. As examples of this form of extortion the city of St. Paul, Minn., has brought suit to collect $30,194.12, due, it is alleged, for back taxes, and the State of Kansas is trying to collect from one of the telegraph companies the very modest sum of $1,300,000, also for back taxes.

This stand, which is taken by so many public authorities, is not so much to be wondered at when we see how a public official who takes the side of the companies is at once subject to even harsher criticism than the executive officials of the telegraph companies themselves. As an example of this, a Pittsburg judge decided recently that a tax of fifty cents per pole was a fair and reasonable compensation for a telegraph company to pay the city instead of one dollar per pole which has formerly been collected. His decision immediately aroused a storm of protest, the other city authorities and the public at large asking the judge who would meet the deficit of $1,500 which this reduction would create in the city treasury.

Still another class of annoyances to which telegraph officials are subject are the suits which are brought against them from time to time for redress for injured feelings.

One of the most interesting of these which we have noted recently is that of a Minnesota man who brought suit against the railroad and telegraph companies because they both failed in their duty in assisting him in carrying out his plans for marriage. He asks damage for the laceration of his feelings, and as the case was reported by the newspapers he also asks for damages for the humiliation of the bride.

These are but a few of the many obstacles which are placed in the way of telegraph companies and which must be overcome in order to keep the business on even a paying basis. It is safe to say that if any one of these obstructionists could occupy the position of a telegraph official for even a short time he would soon change his opinion about the easy path over which their duties lead them.

Under the decision handed down May 28 in the supreme court of the State of Washington, counties in that State cannot tax a franchise given to the Western Union Telegraph Company. The suit was instituted by the Western Union Company against the treasurer of Pierce County to prevent the collection of the tax on its franchise, which was assessed at $15,000, claiming it was operating under a federal franchise and that as such its rights acquired from the city of Tacoma were merely in the form of "police regulations" and conferred no privilege that the company did not already have, the same being given by the United States Government. The supreme court confirmed the judgment of the lower court, from which the County of Pierce had appealed.

Code Telegrams.

The letter system of charging when calculating the cost of a telegram, advocated repeatedly in our columns, says the Electrical Review, London, England, appears to be a step nearer realization. The chairman of the Eastern Telegraph Company when presiding at the ordinary general meeting of the company recently, stated that the Convention "allowed any pronounceable combination up to ten letters to be accepted, but combinations composed of bona-fide words were excepted. 'Abobarbate' was accepted as a legitimate combination, but 'canyoucome,' whether used as plain language or joined together as a code word, was charged as three words. This regulation had given rise to many disputes between their customers and themselves." It is a matter of common knowledge that since the new rules for counting came into force considerable friction has arisen between the telegraphing public and the cable companies, who, by reason of stress of competition, are being driven from strictly interpreting the rules for counting and losing custom, to accepting anything up to ten letters, pronounceable or not; and even if made up of bona-fide words, such as "canyoucome." That the state of affairs has become serious is evidenced by the remarks of Sir John Wolfe-Barry, who speaks not only for the Eastern, but for all the associated companies. The friction has now become universal and unbearable, and if the governments do not see their way to adopt the system of counting on a basis of ten letters to a word owing to the loss it would entail, why do they not, as we have before stated, reduce the number to a fair average of, say, seven letters, and accept anything up to this limit as one word, without any regard as to how it is written? There are also many distinctions made by governments in charging and counting when dealing with inland and foreign telegrams, which are annoying to the public and mean little to the governments concerned, and it is most desirable that uniformity should be striven for in this direction.

Old Time and Military Telegraphers.

President William Bender Wilson, of the Society of the United States Military Telegraph Corps, has appointed Mr. Richard O'Brien, of Scranton, Pa., as member of the executive committee to succeed Orry M. Shepard, deceased. Mr. O'Brien was one of the first four operators to respond to Andrew Carnegie's call in 1861 and served with great distinction in the Military Telegraph Corps throughout the war.

Mr. M. T. Quigley, manager of the Canadian Pacific Railway Company's Telegraphs at Vancouver, B. C., in a recent letter states: "For the seventeenth time in succession I am enclosing you herewith my renewal to Telegraph Age, and am glad to be able to do so. Kindly see that it continues to come to me as usual for another twelve months as I should feel lost without it."

The Military Telegrapher in the Civil War.

PART XXII.

Mr. James P. Cassidy, of Minneapolis Minn., who has been actively identified with the telegraph for the past fifty years, and for many years previous to two years ago was manager of the Minneapolis office of the Western Union Telegraph Company, now employed by the North American Telegraph Company at the same place, spent most of the four years of the Civil War from 1861 to '65, in and around Richmond, Va. Mr. Cassidy is therefore, well qualified to tell the story of the Confederate operators, that small body of men who were just as active, brave and loyal in proportion to their numbers as those identified with the cause of the Union, on this side of the Mason and Dixon line. Mr. Cassidy's narration, which is now published for the first time, is largely historical, and graphically covers a subject that will make an interesting chapter in the telegraph war reminisences now being recited in these columns:

"When sixteen years of age I felt highly honored to be sent from my native city, Richmond, Va., to take charge of the first telegraph office opened in Danville, Va., then the terminus of the Richmond and Danville Railway (now part of the Southern Railway System). After attending the Inauguration of President Lincoln, at Washington, March 4, 1861, during a vacation, I returned to Danville where I found much excitement prevailing and preparations being made for war. Military organizations existed in all Southern cities for years previous to the breaking out of the war, and the Confederate Armies were not made up of raw recruits as many supposed. One of these companies located at Danville, was expecting daily orders from the Governor of the State to report to the Camp of Instruction at Richmond, and for several days, from morning until night my office was crowded with members and their friends waiting to hear the order which finally came. 'On to Richmond,' was the cry.

"Many of the telegraph operators in the South at this time who were members of these military companies, tendered their resignations to the telegraph or railroad companies, filled with enthusiasm, excitement or patriotism, and it looked as if the telegraph service would be badly crippled, so much so, that the following general order or request was received about this time:

Rchmond, Va., April, 1861.

To All Telegraph Operators:

Please remain at your respective offices, where your services will be as valuable or more so to the state than in the field.

(Signed) J. R. Dowell,
General Superintendent.

Approved:
(Signed) John Letcher,
Governor of Virginia.

"Everything became so quiet after the soldiers left that I resigned my position there to go to Richmond, where there was something doing. At this time the Confederate Army had a few telegraph operators, enlisted men who were detailed for telegraph service but more were needed. The system I believe, was about the same as prevailed in the United States Army, as far as obtaining telegraph operators was concerned. That is, if a general commanding a department wanted an operator and had none that he could detail, he would request the secretary of war to send a telegrapher, who in turn requested the general superintendent of the Southern Telegraph Company to furnish one, which was done whenever possible.

"A few days after my return to Richmond from Danville I was asked if I could go without delay to Williamsburg, Va., as an operator was needed there at once. 'Yes,' I said, 'and I am ready to start at any moment.' I arrived in Williamsburg, about fifty miles from Richmond and twelve miles from Yorktown. The next day I took possession of the telegraph office, there being no operator there, cut in the wire and reported ready for business. There was comparatively little to do for a few days. I used couriers between the telegraph office and Fort Magruder, one mile distant on the road to Yorktown.

"Ten days later, about four p. m., I received an order to cut out the wire, call on Captain Morris, quartermaster, for an ambulance and report as soon as possible at the headquarters of General John B. Magruder, at Yorktown, as his operator had dissappeared and his whereabouts was unknown. Probably my old friend Nat. B. Topping, who, when last heard from, was working at 195 Broadway, New York, for the Western Union Telegraph Company, knows who that operator was. Some months afterwards he told me at Goldsboro, N. C., how it happened.

"After an all-night's trip on the rickety ambulance I arrived at Yorktown the next morning at seven o'clock, and immediately cut in the instruments. After two weeks' work at this place I was taken sick with chills and fever and became so ill that the surgeon thought I had better return to Richmond, where after a few days rest I was again ready for service.

"Among my associates at the different points were operators Beverly W. Wrenn, now president of the Manhattan Auto-Car Company, New York; J. W. Brown, manager of the Western Union Telegraph Company, at Augusta Ga., and Roy O. Crowley, now with the same company, at Atlanta Ga.

"Joseph T. Caldwell was military telegraph superintendent with headquarters at Richmond; Fred D. Cudlipp, operator at Richmond; at Drewry's Bluff was Luther Cosby; at Fort Malvern was Lee Jackson, now of Hartford, Conn.; at Meadow Bridge Road, John L. Cassidy, now located at Minneapolis, Minn., with the North American Telegraph Company; at Brooke Turnpike, Robert Hotz, and at Hanover Junction was William Duke. There were a few others in the military service whose names I cannot now recall. When Colonel Dahlgren, United States cavalry, raided the suburbs of Richmond, these

operators rendered valuable service to the Confederacy. The city would have been captured but for them, as there were but few troops there. Colonel Dahlgren was killed in this raid.

"After my recovery I accepted a position with the Virginia Central Railroad Company at Richmond (now part of the Chesapeake and Ohio Railway System). In that office were Edward Smith, Edward Kendrick and myself. Over the railroad the almost daily shifting of Confederate troops was going on. Sonewall Jackson's, Hill's, Longstreet's and other Confederate army divisions, were being hauled between West Virginia, Manassas, Culpepper, Richmond and the Peninsula, back and forth. However, the locomotives and cars were in bad shape and insufficient in number, making long marches on foot necessary. Occasionally I was sent to different railroad stations along the line in cases of emergency. During this time the Seven Pines, Fair Oaks, Gaines Mills, Malvern Hill and other battles occured, the latter fought June 30 and July 1, 1862. General Joseph E. Johnston, commanding the Confederate States army fell, badly wounded at Seven Pines battle, and was succeeded by General Robert E. Lee, who commanded during the remainder of the Seven Days battles around Richmond. I was then ordered to Louisa Court House Station, sixty miles north of Richmond, to relieve H. Clay Reese, operator, and while there received telegrams for General Jackson, who was on the march from Richmond to Gordonsville. The operator at Beaver Dam station told me over the wire, about what time to expect Stonewall Jackson at the head of his troops. I met him in the middle of the main traveled road, riding his little sorrel. I delivered the messages to him for which he thanked me and rode on. A few days after this I was ordered to the Gordonsville office where H. S. Smithers was manager with Talley Mann and myself as operators. This was in the latter part of August, 1862.

"General Stonewall Jackson slipped his army around Pope's and succeeded in capturing sufficient of Pope's army stores to keep his men with plenty to eat during the campaign. This was the beginning of the second Bull Run battle. General J. E. B. Stuart, at this time raided General Pope's headquarters and captured a few prisoners; also General Pope's new uniform. An orderly brought the uniform coat to the telegraph office where we telegraphers tried it on for curiosity.

"After the defeat of General Pope in September, 1862, I was ordered to Staunton, Va., sixty miles west of Gordonsville. The train moved very slowly up the mountain grades to this point and an amusing incident occurred while en route. While moving at a slow pace close to a field of onions, the tops being nearly a foot high, out tumbled from the train about a thousand of the soldiers and when they returned there was not an onion top to be seen on the acre plot, while a man and woman standing in the door of a cabin looked on in amazement at their vanishing crop. The scrambling of the men to get back to the train while in motion was as amusing as their tumbling down the embankment over each other when getting to the onion patch.

"Immediately on reaching Staunton I was ordered back to Richmond, where I entered the Southern Telegraph Company's service at Hamilton's Crossings, the extreme right of the Confederate's line of battle with Burnsides about one mile south of Fredericksburg, Va. A temporary shack was put up at the railroad crossing for a telegraph office. We kept orderlies on the gallop to Stonewall Jackson's headquarters nearby. Within a few days after the battle of Fredericksburg everything became quiet in that locality and being ordered to close the office and return to Richmond, I entered the main office of the Southern Telegraph Company, in which were employed the following officials and operators: Dr. William S. Morris, president; J. R. Dowell, general superintendent, George W. Rady, superintendent; R. M. J. Paynter, manager; Joseph McGovern, chief operator; George McGovern, Richard Millan, Samuel J. Hoffman, (the only deaf and dumb first class telegraph operator known,) Joseph W. Kates, William Taylor, N. C. Pamplin, Tom Maddox, W. D. S. Anderson, June Potts, B. W. Wrenn, Fred Burrus and myself operators.

"Another prominent figure in Richmond at that time was Mr. J. B. Tree, who is now living in retirement at that point and is known as a grand old man. He is a forty-niner of the telegraph and is respected by everyone who has the pleasure of his acquaintance. His duties as general superintendent of the American lines, and military superintendent were begun in the last eighteen months of the war between the States, and were not in the field, so that except a skirmish at Staunton River Bridge about ninety miles south of Richmond during General Wilson's raid around General Lee, in which the former general did no succeed in burning the bridge and was finally defeated by General Mahone on the Petersburg and Weldon Railway. Mr. Tree was constantly traveling between Richmond and Mobile, Ala., supervising and extending as far as the limited supply of material would allow, a prompt communication between the various military headquarters south and Richmond the heart of confederacy.

"It may be news to many of the Telegraph fraternity of the present age, especially in the north and west that the record of the first telegraph operators union and strike ever organized, was made in Richmond, Virginia, in 1863. Many of the operators were talking organization and strik.. The day was set for a strike, when the Telegraph company's officials heard of it," and immediately concluding to 'nip it in the bud,' reported the matter to the military commander at Camp Lee;

the commander asked for, and was given the names of the prime movers of the telegraphers union, located in Richmond, and said, 'Leave this matter to me, it is absurd. I will attend to them.' The next day a Lieutenant and squad of infantry marched down Main street, to the Southern Telegraph Company's main office, halted his squad outside, on the sidewalk, and walked into the office.

The affable, polished, gentlemanly William Anderson waited on the Lieutenant at the counter, and the following conversation took place:

Lieutenant: 'Is Mr. Chas. A. Gaston in?'

Anderson: 'No sir. I believe he is working in Augusta, Ga., office' (Gaston was said to be the head of the Union).

Lieutenant: 'Is Mr. W. D. S. Anderson in?'

Anderson: 'Yes, sir. That is my name.'

Lieutenant: 'Is Mr. Lee Jackson in?'

Anderson: 'No, sir, I think he is working at Fort Malvern.'

Several others were then named, and called to the counter:

Lieutenant: 'Gentlemen, I have an order from the commander of Camp Lee, for your arrest, please put on your coats and hats and come at once with me.' The operators smiled at each other, wondering what was the trouble, and filed out of the office door.

Lieutenant: Turning to the squad. 'Attention. Carry arms.' (Turning to the operators), 'Gentlemen, — Please fall in line, about face, march.' They marched out to Camp Lee about four miles. The Commander was not there, having an engagement that evening elsewhere. The operators were placed in the guard house for the night. Early the next morning, they were brought before the Commander, who lectured them severely on the absurdity of such a thing as a telegrapher's strike at such a time, when so much depended upon them, appealing to their manhood, as the enemy were at our very doors. He told them plainly that if any further action was taken towards a strike, he would conscript every one of them and see that they were placed in the ranks and that each one carried a musket. All promised to be good and the strike was over. They were then discharged by the commanding officer, who requested them to return to their duties. That was the last heard of the first telegraphers' strike.

"In the Petersburg, Va., office of the Southern Company were Charles Clarke, manager; William W. Thweatt, and James Burruss, operators. Within a few weeks I was ordered to Lynchburg; in that office were John M. Crowley, superintendent; William Sanford, manager; Beverly W. Wrenn (after the war general passenger agent of the East Tennessee, Virginia and Georgia Railway for many years), Louis La Fuchea and myself operators. I was next ordered to Goldsboro, N. C., at General Whiting's headquarters. David S. Ryan was manager of the main office at that point; Nat B. Topping, Whitfield Hancock, Robert Hancock and myself operators. At Magnolia, N. C., near Wilmington, Nat Lee was manager. A few weeks later I transferred my services to Wilmington, N. C., J. W. Brown being the manager; E. T. Ward and myself were the operators. After a few weeks I was ordered back to Richmond, stopping at Weldon, N. C. where William E. Dulin was manager. Here I found orders to report at Stoney Creek, Va., at General Wade Hampton's headquarters. On my arrival there the General had left in the morning in hot pursuit of General Kautz's United States cavalry, who had raided the railroad and destroyed the telegraph wires and railroad tracks. I thereupon returned to Weldon taking the Raleigh and Gaston Railroad, intending to reach Richmond via Raleigh and Greensboro, N. C., over the Richmond and Danville Railroad. At Raleigh I called at the Southern Express Telegraph Company's office, Rufus B. Bullock, president. (After the close of the war Mr. Bullock was elected Governor of Georgia), John Courtnay was superintendent; Bowling W. Starke and John Bragg (nephew of General Braxton Bragg, Confederate States army), operators. Every wire north was cut, and not a single circuit was working to Richmond. Superintendent Courtnay asked me to go to Charlotte, N. C., and help him out there as Richmond was well surrounded by General U. S. Grant's army and it was doubtful if I could get through the lines. I went to Charlotte, where I worked for a few days when I left for Richmond. I arrived at Burkeville Junction, fifty miles south of Richmond, where James Harris was manager. Here the trains were tied up on account of General Kautz' raids which had destroyed the tracks and the telegraph lines. Three or four days afterwards I reached Richmond, where I began working a double-trick, one for the Southern Telegraph Company, and one in the general superintendent's office of the Richmond and Danville Railroad. In the office of the latter I found Mr. Leonard Cox, late traveling auditor of the Western Union Telegraph Company, who died April 19, 1909, and who was then chief clerk and operator to the general superintendent, and John L. Cassidy, who had resigned his position at the fort on Meadow Bridge Road. Mr. James L. Morrow, superintendent of telegraph was superseded by Harry Clark. I was called upon frequently to make trips to Petersburg, a distance of twenty-two miles, to help out. On one occasion before leaving for Petersburg, I bought a new suit of gray clothes, for which I had to pay $400 in Confederate money, the supply and demand ruling. Printing presses were running freely, but cloth was scarce.

"On another occasion I was ordered to Petersburg and on reaching that place I found the shelling of the town going on furiously from the Union batteries, and a cannon ball passed through a room in the hotel near the one I was occupying.

"At this time Lee's army having been reduced to a mere skeleton with no resources to draw on, and General Grant pressing him hard on all sides with the world to supply his wants, the great struggle appeared to me to be rapidly drawing to a close.

"Operator Edward Emith accompanied General Lee on his retreat from Petersburg to Appomattox, after the battles with General Grant at Chancellorsville, the Wilderness, Spottsylvania and other places. I recall vividly the evacuation of the City of Richmond, Sunday, April 2, 1865. I had worked part of the day at the key in the main telegraph office. A telegram from General Lee at Petersburg to President Jefferson Davis, was received by another operator in the forenoon to prepare to evacuate the city at once. Preparations on the inside commenced during the afternoon; heavily loaded wagons each pulled by four mule teams were hauling the treasure and government archives down Main street passing the telegraph office en route to the Danville Railroad Depot. The people generally did not know what was going on.

Rufus B. Bullock, president of the Southern Express Telegraph Company, happened in our operating room about five p. m. He handed a twenty dollar gold piece to Manager Richard Paynter saying 'Dick, take this. You will probably need it to-morrow. I am leaving the city to-night.' It was the first gold piece I had seen in three years. On my way to the Danville depot where I was to work that night I passed Peterson's drug store, and thinking of a twenty dollar Confederate bill I had in my pocket, and believing it would be worthless the next day I stopped in the store and called for some cigars. A box was handed me out of the showcase containing cigars which would cost about three cents apiece before the breaking out of the war. I asked the price and was told that they were two dollars each. I took ten cigars and handed him my last bill, but to show the confidence existing in the cause and General Lee's army and the security of Richmond almost at the last moment, while I was lighting one of the two dollar cigars, an old gentleman walked into the store and said: 'Well, Peterson, it is rumored that we may evacuate the city to-night or to-morrow.' Mr. Peterson replied: 'Never! Never! Never! Why we have had such rumors for nearly four years! Never!'

"I then started for the depot telegraph office where I was due and worked nearly all night at the key on train orders. The next morning, or before daylight, Mr. Peterson's fine drug store was a pile of brick and mortar, and several solid blocks of stores on each side of him burned to the ground. It was a sight never to be forgotten by those who witnessed the scenes. Pandemonium reigned. Assistant Superintendent and Train Despatcher Young and myself worked until about four a. m., April 3, running out the several special trains during the night by telegraph orders. Just before the last train pulled out, Young rushed up stairs into the office and said, 'Hurry up, Cassidy. The last train will pull out in three minutes. The engineer corps are preparing to burn the bridges. Come on!' I was sending the last telegraph train order and said 'All right.' But I thought over the matter seriously and had no idea of leaving Richmond, presuming the end of the war had come. From midnight we could hear the mob of hoodlums, low negroes, and the crackling of the burning buildings within two blocks of us. When Mr. Young ran down the stairs, I looked out of the window, over to the passenger train tracks, and saw the last train pull out, loaded partly with the engineer corps, who set fire to the wooden covered bridges, the flames shooting up as their train passed over the river. There were then fired buildings and bridges all around us, the depot offices and freight warehouse covered nearly a whole block, and were brilliantly illuminated, every gas jet being left burning. I was apparently the only person left in the building. Looking over the offices, my first thought was, 'all this will be burned before daylight, I believe I will take a set of telegraph instruments home.' Then I changed my mind, as I would have no use at home for such things. I glanced into the general superintendent's office adjoining and was attracted by a new gold plated base inkstand on his desk. I poured out the ink, wrapped up the inkstand and have been using it almost daily on my desk for over forty-four years since. I then walked down stairs and met Harry Clark, the railroad telegraph superintendent, he also having concluded to remain behind. We then went into the door at the foot of the stairway leading into the freight warehouse where there was thousands of pounds of bacon and other army stores that could not be moved for want of trains. We secured a load of bacon and after dodging the mobs and fires and making a circuitous route reached our homes about three miles distant at five o'clock in the morning. My father and mother were awake waiting for me. I fell across the bed completely exhausted and while talking to my mother an explosion of a large powder magazine within a quarter of a mile of my home occurred, which caused the ceiling plastering to fall over me. That with other powder magazines in the city and the breaking of window glass, it seemed as though the lower regions had broken loose. However, I slept two or three hours, ate breakfast and went down town to see what was going on. Arriving at the corner of Ninth and Grace streets, I saw about twenty United States cavalrymen ride into the State Capitol grounds. They hoisted the stars and stripes on the flagstaff of the State Capitol and rode away. I then went into the business center where the fires raged. The hand engines were standing in the middle of the streets, useless on account of the bursting of hose or they may have been cut

by the mob who would break into store doors and windows, loot the stores, strike a box of matches and then spread the fire. Later in the day part of General Weitzel's United States Army division of colored troops marched in and he put many of his men to work extinguishing the fires. General Lee surrended at Appomatox April 9, 1865. Two or three days later I was walking down Seventh street towards Main street and passing across Franklin street, I saw General Lee with his staff officers riding up Franklin from Ninth street, to his Richmond residence between Seventh and Eighth streets. They had just arrived from Appomatox. He dismounted in front of his residence one of the staff taking the bridle of his horse, he immediately walked across the sidewalk into the low iron gate, turned around, saluted his staff, then lifted his hat without speaking a word, bowed to the crowd of about one hundred people who had recognized him on entering the city, noble looking and dignified as ever and walked into his front door, alone. That was probably the last time he ever wore the Confederate uniform.

"On April 17, 1865, as per general orders, of the United States Commander of the Department of Richmond, all Confederates were prisoners of war ,and required to appear at the Provost Marshal's office and take the oath of allegiance to the United States Government. My parole, which is yet in my possession, reads as follows:

Provost-Marshal's Office,
Third District.
Richmond, Va., April 17, 1865.

I do hereby certify that on the 17th day of April, 1865, at Richmond, Va., the oath prescribed by the President of the United States in his proclamation of December 8, 1863, was duly taken, subscribed, and made matter of record, by James P. Cassidy, at the second District, Provost Marshal's Office, Richmond, Va.

(Signed) Theo. Miller,
Major, 139th Vols., 2nd District,
Provost Marshal.

"A day or two later, having become acquainted with Harper Caldwell and John H. Emerick, of the United States Military Telegraph Corps Chief Operators of Grant's Army of the James, I called at their offices and Caldwell asked me how I would like to work for Uncle Sam, that many of his operators had not been home for four years, and wanted very much to leave. I told him I had not as yet seen the color of a greenback, and would be pleased to accept a position with Uncle Sam or any other uncle, as a telegrapher. He then requested me to go on the first train to Burkeville Junction, Va., which I did, working as an operator. About that time O. H. Dorrance, a former telegraph operator, was appointed United States Military Superintendent of the Richmond and Danville Railroad. After a few weeks at Burkeville Junction, I was ordered with William Embree, Luther Rose and J. Kerbey, United States military telegraph operators, to Danville, Va., where we worked together a few months, when I was ordered by Harper Caldwell to Newberne, N. C. Employed there were George McClenard and O. M. Sadler, United States military operators, Nat Topping and myself, ex-Confederate operators, and others. This was in February, 1866. At Magnolia, N. C., was Nat Lee, an ex-Confederate operator, who recently died in Brooklyn, N. Y. William A. Leary was United States operator at Rocky Mount, N. C. In Atlanta, Ga., were United States Operators Fowler, Martin, Gregg and Henderson. After remaining at Newberne, N. C., for a time I resigned my position as United States military operator and located in Washington, D. C., with the American Telegraph Company, which was merged into the Western Union Telegraph Company in 1867.

Wireless Legislation.

Senator Frye, of Maine, chairman of the Committee on Commerce, introduced a bill in the Senate on June 9 providing that all ocean-going steamships carrying more than 50 passengers shall be equipped with efficient wireless apparatus. Senator Frye has made the same mistake that other lawmakers have made in not requiring all vessels on the ocean whether engaged in passenger or freight traffic to be equipped with wireless apparatus. We would like to have Senator Frye explain what protection his proposed law will offer to a passenger vessel against the innumerable freight steamers which plow the ocean and which are exempt from the operation of his measure.

It is manifestly absurd to require one class of vessels to carry wireless equipment and exempt another class. If Senator Frye desires to protect life and property on the ocean his bill should provide that all sea-going vessels regardless of service or size should be equipped with wireless apparatus. It is the vessel that is not thus equipped that usually does the damage and is the object to be avoided as was shown when the steamer Florida ran down the Republic and called general attention to the utility of wireless on shipboard. Until all sea-going vessels are equipped with efficient wireless apparatus the public which travels the seas will be exposed to danger of the same character as that which befell the passengers of the ill-fated Republic with the added danger that in the majority of cases collisions at sea do not take place under such favorable conditions for rescue as existed when that accident occurred.

THE RAILWAY TELEGRAPH SUPERINTENDENTS MEET IN CONVENTION.

The twenty-eighth annual meeting of the Association of Railway Telegraph Superintendents met at the Hotel Pontchartrain, Detroit, June 23, 24 and 25, about seventy-five active members being present. President W. J. Camp, of Montreal, called the meeting to order at 10.30 a. m. The delegates were welcomed by Mayor Brightmyer and Vice-President Stevens, of the Detroit Board of Commerce, both of whom extended to the visitors the freedom of the city. The response to the welcome was made by J. B. Fisher, of Philadelphia, vice-president of the association.

The following new members were elected:

Active: H. L. Bennett, superintendent of telegraph of the Houston and Texas Central Railroad, Houston, Tex.; William Bennett, superintendent of telegraph of the Chicago and Northwestern Railway, Chicago; James H. Brennan, assistant superintendent of telegraph of the St. Louis and San Francisco Railway, St. Louis; J. W. Fry, assistant superintendent of telegraph of the Chicago, Milwaukee and St. Paul Railway, Seattle, Wash.; T. R. Gooch, chief train despatcher of the Richmond, Fredericksburg and Potomac Railway, Richmond, Va.; Otto Holstein, chief train despatcher of the Cerro de Pasco Railroad, Cerro de Pasco, Peru; L. A. Lee, superintendent of telegraph of the Pittsburg and Lake Erie Railroad, Pittsburg, Pa.; W. B. Jones, superintendent of transportation of the Monon Route, Lafayette, Ind.; J. McMillan, superintendent of the Canadian Pacific Railway Company's Telegraph at Calgary, Alberta; C. W. L. Mickley, superintendent of telegraph of the International and Great Northern Railway, Palestine, Tex.; E. F. Raymond, assistant superintendent of telegraph of the Southern Pacific Railway, San Francisco, Cal.; John F. Richardson, superintendent of the Eastern Division of the Canadian Pacific Railway Company's Telegraph, Montreal, Que.; A. E. Roush, general foreman of the Pittsburg and Lake Erie Railroad, Pittsburg, Pa.; C. F. Smith, superintendent of telegraph of the Chicago and Alton Railroad, Bloomington, Ills.; John Tait, superintendent of the Canadian Pacific Railway Company's Telegraph at Winnipeg, Man.; B. F. Thompson, telephone inspector of the Baltimore and Ohio Railroad, Baltimore, Md.; Frank Tremble, superintendent of telegraph of the Texas and Pacific Railway, Dallas, Tex.; W. F. Wright, chief train despatcher of the Wisconsin and Michigan Railway, Peshtigo, Wis.; William K. Tasker, superintendent of telegraph of the Pere Marquette Railroad, Detroit, Mich.; F. T. Wilbur, assistant superintendent of telegraph of the Illinois Central Railroad, Chicago.

JOHN L. DAVIS, OF CHICAGO.
President of the Association of Railway Telegraph Superintendents.

Associate Members: W. E. Bell, division construction superintendent of the American Telephone and Telegraph Company, Chicago; J. H. Crossman, Jr., division manager of the Bell Telephone Company of Pennsylvania, Harrisburg, Pa.; A. E. Berry, division manager of the Bell Telephone Company of Pennsylvania, Philadelphia, Pa.; A. D. Cloud, associate editor of the Signal Engineer, Chicago, Ills.; Albert Douglas, special agent of the American Telephone and Telegraph Company, Chicago; N. R. Fill, American Telephone and Telegraph Company, St. Louis, Mo.; M. F. Geer, sales engineer of the General Railway Signal Company, Rochester, N. Y.; O. T. Lademan, Railway Telephone and Electric Company, Chicago; J. M. Loring, Central Electric Company, Chicago; H. P. Miller, New York and New Jersey Telephone Company, New York; Val B. Mintun, Missouri and Kansas Telephone Company, Kansas City, Mo.; A. W. Stanley, Norton Telephone Manufacturing Company, Toronto, Ont.; H. P. Folsom, secretary of the Universal Pole and Post Preserving Company, Circle-

ISAAC T. DYER, OF LOS ANGELES.
First Vice-President of the Association of Railway Telegraph Superintendents.

ville, O.; J. S. Gibson and Charles E. Hague, of the railway sales department of the Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y.

Mr. J. S. Hall, of the Michigan Central Railroad, who acted as chairman of the committee of arrangements because of the sickness and death of Mr. E. H. Millington, then outlined the plans which had been prepared for the entertainment of the visitors.

Letters were read from the various telegraph and telephone companies extending the usual courtesies.

The reading of the minutes of the Montreal meeting was dispensed with, printed copies of the same having been distributed among the members. President Camp then made a brief report of the progress of the association during the past year, making mention of the death of four active members since the last annual meeting, namely, Charles P. Adams, of Washington, D. C., superintendent of telegraph of the Southern Railway; Henry C. Hope, of St. Paul, Minn., superintendent of telegraph of the Chicago, St. Paul, Minneapolis and Omaha Railroad; P. W. Snider, superintendent of the Canadian Pacific Railway Company's Telegraph at St. John, N. B., and E. H. Millington, of Detroit, Mich., superintendent of telegraph of the Michigan Central Railroad, who died the day before the meeting of the convention and who was the efficient chairman of the committee of arrangements previous to his illness.

GEORGE A. CELLAR, OF PITTSBURG.
Second Vice-President of the Association of Railway Telegraph Superintendents.

A committee consisting of Mr. A. B. Taylor, superintendent of telegraph of the New York Central; C. S. Rhoads, superintendent of telegraph of the Big Four; William Kline, of Toledo, superintendent of telegraph of the Lake Shore and Michigan Southern; L. A. Lee, of Pittsburg, superintendent of telegraph of the Pittsburg and Lake Erie Railroad; W. L. Connelly, superintendent of telegraph of the Chicago and Indiana Southern, and G. C. Todd, superintendent of telegraph of the Nickel Plate Railroad. was then appointed to attend Mr. Millington's funeral which occurred at St. Thomas, Ont., June 24.

The report of the treasurer, P. W. Drew, which was then read, showed that the association was in a good financial condition.

John L. Davis, of Chicago, superintendent of telegraph of the Chicago and Eastern Illinois Railroad, then gave his report as chairman of the committee of topics, which was accepted with a vote of thanks.

W. K. Morley, of Grand Rapids, Mich., the first president and organizer of the association, was then introduced and addressed the convention, telling of the steps which led up to the formation of the association twenty-seven years ago, it being the outgrowth of monthly meetings which were held in Chicago in the office of Fred H. Tubbs, superintendent of the Western Union Telegraph Company, by those superintendents having their headquarters in and about that city. The object of these meetings was to benefit the telegraph service by an interchange of ideas among those interested.

The regular order of business was then suspended to take up the discussion of the proposed changes in the constitution and by-laws which had already been passed upon at the meetings of the Eastern and Western divisions. This discussion occupied the time of the convention for the remainder of the morning and part of the afternoon session. Several changes were made in the constitution, among the most important of which were the provisions for holding regular meetings of the Western Division of the association in September and January and of the Eastern Division in November and March; the addition of a second vice-president to the list of officers and the raising of the annual dues of the association to seven dollars and a half.

After the adoption of the constitution as revised the report of the committee on "High Tension Wire Crossings," consisting of G. A. Cellar, superintendent of telegraph of the Pennsylvania lines west of Pittsburg, chairman; G. H. Groce, superintendent of telegraph and signals of the Illinois Central, and Charles Selden, superintendent of telegraph of the Baltimore and Ohio Railroad, was presented by Mr. Cellar. As a dividing line, for their purposes, between high tension and low tension work the committee adopted seven hundred volts. As part of their report they drew up specifications for overhead and underground crossings of wires carrying 700 volts or over, the same for cables carrying 700 volts or over, and also prepared specifications for crossing for overhead wires or cables carrying less than 700 volts. In connection with their report they prepared a form of agreement to be entered into by the railroad company and the company desiring to cross the railroad right of way with their wires.

J. L. Davis, C. S. Rhoads and E. P. Griffith took part in the discussion of the committee's report, which all present agreed would be of great value to them in determining the construction necessary to provide a safe crossing for high tension wires.

At the evening session, which lasted from eight until ten p. m., a very interesting paper upon "Efficiency of Office Organization" was read by J. B. Sheldon, superintendent of telegraph of the Union Pacific Railway, Omaha, Neb. Mr. Sheldon outlined the plan of organization adopted in his department and his paper received much favorable comment from those present.

The paper upon "Preservation of Poles" was then read by Mr. H. P. Folsom. Much interesting discussion followed upon this important subject and J. McMillan, superintendent of construction of the Canadian Pacific Railway Company's Telegraph at Calgary, Alberta, brought out the interesting fact that in part of his territory the poles instead of beginning to decay at the ground line began four or five feet below the ground line.

The second day's proceedings began with the reading by V. T. Kissinger, of Lincoln, Neb., assistant superintendent of telegraph of the Burlington system, of his paper upon "Wire Testing and Care of Wires." His paper is given in full elsewhere in this issue. W. P. McFarlane, of the Chicago and Northwestern Railway, Omaha, led in the discussion of Mr. Kissinger's paper giving many additional points of interest upon this important subject. Mr. F. T. Wilbur, assistant superintendent of telegraph of the Illinois Central, explained a short circuit push button arrangement for testing which has been used on his system with very good results.

The paper prepared by H. D. Teed of St. Louis, superintendent of telegraph of the St. Louis and San Francisco Railroad, upon the "Difference Between the Trouble Shooter and the Division Lineman," was then read by E. A. Chenery and discussed by W. P. Cline, J. McMillan, J. B. Fisher, G. C. Kinsman, Charles Selden, G. H. Groce, E. P. Griffith, W. W. Ryder and others. Mr. Selden expressed the hope that the trouble shooter might also become an "induction killer." It was the consensus of opinion that the telegraph linemen could soon be educated to care for the telephone system as effectively as they do for the telegraph system.

J. C. Kelsey, of Chicago, then presented his most interesting paper upon "Telephone Construction." Mr. Kelsey's paper was discussed to some extent by those present, his simple explanation given of the various parts of the telephone system receiving favorable comment from many.

An exhaustive paper upon the subject of "Dry Batteries" was then read by F. H. Loveridge of Chicago. Mr. U. J. Fry, superintendent of telegraph of the Chicago, Milwaukee and St. Paul Railroad, who has had an extensive experience upon this subject, led in the discussion of Mr. Loveridge's paper giving some statistics concerning the use of dry batteries for telephone despatching work and the economy which had been effected by using them on 400 miles of his system. In the other discussion which followed Mr. W. J. Camp gave some interesting facts concerning his experience with the use of dry cells for telephone despatching service and G. H. Groce gave some of his experiences in the use of dry cells for operating a block signal wire.

A committee consisting of W. W. Ryder of Chicago, E. A. Chenery of St. Louis and E. P. Griffith of New York, was then appointed to draw up resolutions of thanks to the telegraph, telephone, and city officials.

At the afternoon meeting of the second day, the first hour was devoted to eulogizing the memories of E. H. Millington, whose funeral services were being conducted at St. Thomas, Ont., while the meeting was in progress; H. C. Hope, C. P. Adams and P. W. Snider, nearly everyone present expressing words of praise for the deceased members.

Los Angeles was selected as the place for holding the next annual convention, which it was decided to hold about the middle of May, the exact date to be decided by the executive committee.

The election of officers which followed resulted as follows: J. L. Davis, Chicago, superintendent of telegraph of the Chicago & Eastern Illinois R. R., president; I. T. Dyer, of Los Angeles, superintendent of telegraph of the San Pedro, Los Angeles and Salt Lake Railroad, first vice-president; George A. Cellar, of Pittsburg, Pa., superintendent of telegraph of the Pennsylvania lines west of Pittsburg, second vice-president, and P. W. Drew, of Chicago, superintendent of telegraph of the Chicago division of the Minneapolis, St. Paul and Sault Ste Marie Railway, secretary and treasurer.

After the election of officers the convention adjourned to the Casino at Belle Isle where a photograph was taken and they enjoyed dinner. On Friday the members of the association and visitors enjoyed a trip to Port Huron and return, going by way of the Grand Trunk Railway, having lunch at Port Huron and returning by steamer down the St. Clair River, across Lake St. Clair and down the Detroit River.

Among those present were:

Angelica, N. Y.—C. L. Lathrop.

Baltimore, Md.—Charles Selden and B. F. Thompson.

Boston, Mass.—A. N. Bullen and S. A. D. Forristall.

Brooklyn, N. Y.—A. F. Ormsbee.

Calgary, Alb.—J. McMillan and wife.

Canton, O.—B. B. Baughman.

Chicago—C. M. Baker, W. E. Bell, William Bennett and wife; T. W. Carroll, A. D. Cloud, John L. Davis, P. W. Drew and wife; Albert Douglas, A. G. Francis, wife and two sons; G. H. Groce, J. E. Ham, C. L. Howk, G. A. Joy, J. C. Kelsey, M. E. Launbranch, E. C. Lewis, J. M. Lorenz, E. Parliment, G. H. Porter, W. W. Ryder and wife; W. H. Slingluff, O. T. Lademan,

F. H. Van Etten., E. W. Vogel, J. V. Watson, F. T. Wilbur and B. L. Winchell, Jr.

Cincinnati, O.—Phillip Case, F. C. Ketzel, I. N. Miller and M. S. Rosenthal.

Circleville, O.—H. P. Folsom.

Dayton, O.—Milton C. Stern.

Decatur, Ill.—G. C. Kinsman.

Denver, Colo.—E. E. McClintock.

Detroit, Mich.—C. Corbett and daughter, T. W. McGarry and wife; A. von Schlegell, Wm. K. Tasker, and G. M. Wehl.

Elyria, O.—A. D. T. Libby and A. B. Smith.

Gibson, Ind.—W. L. Connelly.

Houston, Tex.—A. S. Foote and Percy Hewett.

Indianapolis, Ind.—C. S. Rhoads and wife.

Jackson, Miss.—E. E. Torrey.

Jersey City, N. J.—E. P. Griffith, wife and son.

Kan. City, Mo.—R. L. Logan and V B. Mintun.

LaFayette, Ind.—W. B. Jones, C. T. McHugh, and E. G. Stradling.

Lincoln, Neb.—V. T. Kissinger and wife, and Mrs. A. V. Cornish.

Los Angeles, Calif.—I. T. Dyer.

Memphis, Tenn.—B. Weeks.

Milwaukee, Wis.—U. J. Fry and G. S. Burnett.

Minneapolis, Minn.—L. H. Merrill.

Montreal, Que.—W. W. Ashald and wife; W. J. Camp and wife; H. D. Crouch, Miss Jennings, T. Rodger and wife; G. T. Rooke and A. B. Smith.

Newark, N. J.—H. P. Miller.

New York.—F. A. Baker, R. E. Butrick, W. F. Crowell, H. E. Dunham, J. J. Ghegan, E. R. Gill, J. B. Given, W. E. Harkness, wife and daughter; W. G. Hovey, B. A. Kaiser, J. T. Kinder, John Langan, H. E. Merrell, P. W. Miller, F. G. Sherman and wife; G. W. Swan, J. B. Taltavall and wife, and A. B. Taylor and wife.

North Bay, Ont.—F. T. Jennings.

Oil City, Pa.—F. G. Boyer.

Omaha, Neb.—W. B. McFarlane and wife and J. B. Sheldon and wife.

Ottawa, Ont.—C. E. Davies.

Philadelphia, Pa.—J. B. Fisher and J. O. Oliver.

Pittsburg, Pa.—G. A. Cellar, G. A. Dornberg, L. A. Lee and A. E. Roush.

Port Huron, Mich.—E. J. Cornell.

Portsmouth, Va.—W. F. Williams, wife and two daughters.

Quebec, Que.—E. Pope.

Richmond, Va.—T. R. Gooch and J. S. Stevens.

Rochester, N. Y.—R. F. Button, M. F. Geer, J. F. Gibson, C. E. Hague, G. D. Morgan, E. O. Munson and W. W. Salmon.

Sandwich, Ills.—E. Parsons, C. S. Rhoads, Jr., and H. O. Rugh.

San Francisco, Cal.—E. F. Raymond and wife.

St. Paul, Minn.—George Boyce and O. C. Greene.

Schenectady, N. Y.—J. B. Taylor.

St. Louis, Mo.—E. A. Chenery and wife, and N. R. Fill.

Syracuse, N. Y.—Bert H. Shepard.

Trenton, N. J.—R. R. Newell.

Toledo, O.—William Kline.

Toronto, Ont.—W. J. Duckworth, William Marshall, I. McMichael and A. W. Stanley and wife.

Valparaiso, Ind.—G. M. Dodge.

Wilmington, N. C.—W. P. Cline.

Wilmington, N. C.—W. P. Cline.

EXHIBITS AND REPRESENTATIVES AT THE CONVENTION.

The exhibits at the convention were more numerous than usual and especially attractive, receiving much favorable comment from those present.

The General Railway Signal Company displayed for the first time their selective train despatching apparatus, the invention of G. H. Groce, superintendent of telegraph and signals of the Illinois Central Railroad. Their exhibit attracted much attention from the fact that it was entirely different in construction from any of the others shown involving principles in successful use in railway signal apparatus. They were represented by W. W. Salmon, president; George D. Morgan, vice-president and treasurer, and M. F. Geer, sales engineer of the company, Rochester, and W. G. Hovey, special agent at New York.

The Sandwich Electric Company was represented by H. O. Rugh, C. S. Rhoads, Jr., and E. Parsons. They demonstrated the operation of the selectors and adjustable telephones. A distinctive new feature was shown in a cordless jack box enabling one telephone to be used on a number of circuits without the possibility of cord trouble.

The interests of the Kerite Insulated Wire and Cable Company of New York were ably taken care of by Percy W. Miller of their New York office. The Watson Insulated Wire Company, the Western representative of this concern, was represented by J. V. Watson and B. L. Winchell, Jr.

The Duplex Metals Company of New York displayed in the corridor just outside of the convention parlor an electric sign representing a cross section of their copper clad steel wire. They were represented by J. B. Given, vice-president and J. T. Kinder, secretary of the company and J. E. Ham of their Chicago office.

The Okonite Company, of New York, was represented as usual in the person of their genial salesman, John Langan.

Mr. J. J. Ghegan, president of the J. H. Bunnell and Company, Incorporated, New York, was present at the convention as usual, and distributed combination pen and pencil holders to the gentlemen and change purses to the ladies.

The Stromberg-Carlson Telephone Manufacturing Company of Rochester, N. Y., was on hand with an attractive display of their selective despatching equipment showing a master station and three line stations. They also showed a complete line of their standard telephone apparatus consisting of iron clad railway telephones, jack boxes, portable and semi-portable telephone sets and magneto wall telephones. Their exhibit was in charge

of E. O. Munson, assistant advertising manager and Messrs, Hague, Gibson and Button of the Rochester office; J. O. Oliver of Philadelphia and E. C. Lewis of Chicago.

The Rock Island Battery Company, of Cincinnati, was represented by Mr. M. S. Rosenthal, president of the company and Phillip Cass and F. C. Ketzel. They displayed a complete line of their dry batteries showing the construction of the various parts.

The Dean Electric Company of Elyria, O., displayed their indestructible telephone apparatus. The feature of their receivers and mouthpieces which should be of value for rough usage such as many instruments have to meet in railway service is their construction of drawn metal covered over with black composition giving them the usual appearance of such apparatus at the same time insuring them from breakage. Their exhibit was in charge of Messrs. A. D. T. Libby and A. B. Smith.

The United States Electric Company of New York, exhibited both their multiple and single station selective calling systems with master selector and several station equipments in operation on each system. Their single station central battery selector, by means of which any station on the line may be called in from two to eight seconds, has been found to meet successfully the demands of nearly all railway systems. The company was represented by H. E. Merrell, general manager, E. R. Gill, electrical engineer, and M. E. Launbranch, manager of the Chicago office.

The interests of the Railway Supply Company of Chicago were represented by E. W. Vogel, signal engineer of the company.

G. M. Dodge of Valparaiso, Ind., exhibited to those interested his automatic self teacher of telegraphy.

John A. Roebling's Sons Company of New York was represented by R. R. Newell of the Trenton office, G. W. Swan of New York and W. H. Slingluff of the Chicago office.

The Railway Telephone and Electric Company, La Fayette, Ind., exhibited a full line of their railway telephone apparatus. Their exhibit was in charge of O. T. Lademan, general manager of the company.

The Kellogg Switchboard and Supply Company of Chicago was represented by J. C. Kelsey, G. A. Joy and Edward Parliment. They displayed a full line of their telephone equipment of various styles for use in connection with telephone train despatching.

The Egry Register Company of Dayton, O., was represented at the convention by M. C. Stern, treasurer and general manager.

Charles E. Davies, chief operator of the Great North Western Telegraph Company at Ottawa, Ont., in response to requests from several of the superintendents exhibited a full set of his telegraph repeaters which are giving such good satisfaction in Canada. Mr. Davies' invention gained a favorable impression and several of those present contemplate giving it a trial. Its predominating features are its simplicity and ease of adjustment which is no more complicated than that of an ordinary relay.

The Western Electric Company's exhibit occupied two rooms on the parlor floor. A full line of telephone apparatus for railway service was displayed, also Gill and Cummings-Wray selectors. Several types of portable or train telephones were shown as well as various styles of transmitter arms for train despatching service. A paper weight of oxidized bronze was distributed to visitors as souvenirs. The company was represented by W. E. Harkness, sales engineer; Messrs. H. L. Burns and R. F. Spamer of New York and C. L. Howk and J. H. Finley of Chicago. In addition to these gentlemen H. D. Crouch, sales manager of the Northern Electric and Manufacturing Company of Montreal, the Canadian Branch of the Western Electric Company, was present. Mr. Loveridge, the dry battery expert of the Western Electric Company, was also present and read an interesting paper upon the subject of "Dry Batteries."

NOTES OF THE CONVENTION.

Mrs. H. J. Kinnucan, wife of the superintendent of the Postal Telegraph-Cable Company at Detroit, acted as chairman of the ladies' committee in the absence of Mrs. Millington. Many of the Detroit ladies kept the visitors supplied with roses during the convention.

Among the telegraph people of Detroit who assisted in making pleasant the stay of the superintendents in that city were: H. J. Kinnucan, superintendent of the Postal Telegraph-Cable Company; P. J. Becker, manager; J. Z. Hayes, chief operator; W. C. Griffin and P. W. Williams, of the Detroit office of the Postal.

C. Corbett, formerly superintendent of the Western Union at Cleveland, Ohio, now a resident of Detroit, was among those present at the convention to greet old friends.

G. S. Burnett, of Milwaukee, of the Morse Code Signal Company, that city, was present greeting his old friends and viewing the exhibits.

Mrs. T. D. McGarry and Miss Emery, of Detroit, rendered valuable assistance to Mrs. Kinnucan and the others who arranged the plans for

Mr. W. Marshall, superintendent of construction of the Canadian Pacific Railway Company's Telegraph at Montreal, who served on the committee of arrangements, proved a most efficient host, being on hand night and day, notwithstanding the extreme warm weather, to see that all of the visitors were well taken care of.

The Railroad.

An official of the St. Louis and San Francisco Railroad, according to the Train Despatcher's Bulletin, investigating the telegraph service on the lines of that company, estimates that more than one-third of the telegrams transmitted are

unnecessary, and that the average message contains ten per cent. more words than are necessary. In the month of December last the five relay offices of the road sent and received 240,415 telegrams (repeated messages apparently are counted but once). The Frisco-Man, reporting these facts, prints a number of examples of railway messages which were two or three times longer than was necessary.

The twenty-second annual convention of the Train Despatcher's Association of America, which met at Columbus, Ohio, June 15, 16 and 17, was largely attended, and was one of the most successful of any in the history of the association. The election of officers resulted as follows: President, T. D. Dellmin, Youngstown, Ohio; vice-president, F. G. Hagner, Reading, Pa.; secretary-treasurer-editor, J. F. Mackie, Chicago, Ill.; executive committee, J. D. Harrod, Columbus, Ohio.; W. H. Halter, Williamsport, Pa.; F. J. Mendel, Sunbury, Pa.; E. A. Strauhber, Salamanca, N. Y. The next annual meeting will be held at Spokane, Washington, June 21, 1910. Among the papers read at the convention was one by F. C. Dow, of Sheridan, Wyo., upon "Uniform Understanding of Train Rules and Orders," and one by J. F. Mackie upon "The Train Despatcher's Status."

DEATH OF E. H. MILLINGTON.

The many friends of Ethan Hall Millington, superintendent of telegraph of the Michigan Central Railroad, were shocked to

E. H. MILLINGTON.
Late Superintendent of Telegraph, Michigan Central Railroad, Detroit, Mich.

hear of his death which occurred at St. Thomas, Ont., June 22. While it was known that he had been in poor health and had gone to St. Thomas to recuperate, but few knew that his condition was at all serious. Mr. Millington was born at Guelph, Ont, December 1, 1859, and entered the employ of the Montreal Telegraph Company as messenger in his native place in January, 1873. Being of studious habits he returned to school for a period of about six months before accepting the position of clerk and assistant operator with the Dominion Telegraph Company. In 1878, he again went back to his studies, continuing them until March, 1880, when he reentered the telegraph service, this time as operator for the Dominion Company at Chatham, Ont., from which point he was soon transferred to London, Ont., and in April, 1881, he was promoted to be chief operator at that point. Deciding to change from commercial to railroad telegraphy, Mr. Millington, in January, 1882, obtained a position as operator with the Canada Southern Railway. He afterwards held various positions jointly between the Michigan Southern, Michigan Central and the Canadian Pacific Railroad freight offices, until December 17, 1889, when he was appointed chief operator of the Canada Division of the Michigan Central. From this post he was promoted to be private secretary and chief clerk to Division Superintendent J. B. Morford, in October, 1894, and on August 15, 1902, received the appointment of superintendent of telegraph of that road, with headquarters at Detroit, which position he held up to the time of his death.

Among recent guests whom Mr. F. C. Mason, formerly superintendent of police telegraphs of Brooklyn, has entertained at his country home near Utica, N. Y., are Major Scott Truxton, of San Juan, Porto Rico and F. C. Millett, wife and daughter, of New York.

A week-end party consisting of F. C. Mason, C. W. Price, George T. Manson, Colonel Ezra De Forest and William H. Hodgins was recently entertained by Commodore W. L. Candee, at his country home at Bay Shore, L. I. One of the pleasant features of the outing was a cruise along the shores of Long Island in Commodore Candee's private yacht.

The Preservation of Poles.*

BY H. P. FOLSOM.

Before entering upon our subject proper we deem it advisable to make a few general remarks on the subject of poles and the former theories of their preservation.

There are about 40,000,000 poles in use in the United States, by telegraph, telephone and other companies, valued at $5 to $7 each, on an average, or a total of $200,000,000 to $280,000,000. It requires about 3,800,000 poles each year to replace those that have become useless from decay. The average life of white cedar and chestnut poles in the United States, other than the Gulf States, is about twelve years. Hence, the depreciation is about eight and one-half per cent per year, or $17,000,000.

The subject of the preservation of timber has engaged the attention of scientists and engineers for over a hundred years.

In 1884 Mr. Boulton, an eminent engineer of England, read a paper before the Royal Society of Engineers, in which he reviewed all the known methods of treating timber antiseptically. He had an experience of over thirty years in treating poles. He showed that the brush treatment, the open and closed tank treatments, the vacuum and pressure processes, with and without heat, were then in use; that creosote, sulphate of copper, zinc chloride, corrosive sublimate, and twenty-five or thirty other well-known germicides, were in use or had been tried at that time; over a hundred patents had been taken out on wood preservers, and different methods of injecting chemicals into timber. Indeed, all the different chemicals now in use to preserve poles were well known then. This paper of Mr. Boulton was discussed by practical engineers from many countries, and it, together with the discussions, were printed in book form. It constitutes to-day a classic on the antiseptic treatment of timber. Yet, at that time the real cause of the decay of timber was not known to more than a dozen in the convention. Indeed, fungi, as a cause of the decay, was scouted by some of the greatest scientists in the world at that time. Yet, strange as it may seem, every one of the chemicals that had been used were most powerful germicides and are to-day in constant use for that purpose. It is a well-established fact that the cause of the decay of poles at the ground line is a fungus growth. In other words, a germ which feeds upon nourishment taken from the timber. Furthermore, it is known that this germ attacks the pole from the outside and not the inside (except, of course, in cases of butt rot).

Although these various methods of impregnating timber with chemicals have been known and used with some variations for sixty years it is estimated that less than ten per cent. of the poles in use in the United States have been treated by any method.

This doubtless comes: First, from the plentifulness and cheapness of poles.

Second.—From the fact that most methods require large and expensive plants, and therefore require the poles to be transported to the plant for treatment, thence to the point where they are used.

Third.—Because of the difficulty of obtaining positive and uniformly good results.

Mr. Boulton in his paper and the discussions thereof established that the materials used to preserve poles by the method then used must have two properties.

A. It must be a germicide, and

B. It must be a germ excluder. That is, it must be of and in itself a germicide and a germ excluder.

The great effort of all experimenters and scientists from that day to this has been to get some chemicals, or combinations of chemicals, that when injected in a soluble condition would become immediately insoluble. That would not wash, leach or soak out, but would remain in the timber indefinitely and kill the germs therein, and prevent other germs from entering. Science has so far failed to find this substance. It is a very easy task to obtain powerful germicides. Indeed, there are many such —sulphate of copper, chloride of zinc, creosote, chloride of sodium, sulphate of iron and many others, are all powerful and efficient germicides and cheap enough, too, to be used in the preservation of poles. So powerful is sulphate of copper that one drop of a saturated solution thereof placed in a fish aquarium holding four gallons of water will destroy all the algae therein, yet leave the fish uninjured; or, if you place one-half ounce of sulphate of copper in a cistern containing sixty or seventy barrels of water, it will kill all the algae therein and render the water almost pure. Chloride of sodium or common salt is one of the most universal and widely used preservatives of both animal and vegetable matter known. Canal boat builders have for years been in the habit of placing a false bottom or box between the ribs of their boats and filling this with salt. As the boat sunk in the water from its weight the timbers became soaked and the salt is taken up by capillary attraction and the osmotic forces. Many barrels of salt were yearly thrown into the bilge. We are told that all owners of wooden vessels sailing the Great Lakes use large quantities of salt every year in preserving their vessels. From ten to fifty barrels being used sometimes, according to size of the boat. Common observation teaches us that salt barrels, fish kegs, wooden salt evaporation tanks do not decay. Salt brine from the ice-cream freezer thrown on the grass poisons the plant food and it dies. So with the wood-destroying fungus in a pole, the salt and sulphate of copper poisons its food, it dies and decay ceases.

It is a popular notion that deep penetration of germicides is necessary to effectively preserve timber or poles. This we have found by common observation and many experiments with the micro-

*A paper read at the convention of the Association of Railway Telegraph Superintendents, at Detroit, June 23-25, 1909.

scope is not true. The wood-destroying germs begin their ravages on the outside and work towards the center of the pole. It follows, then, that if the germ on and near the surface of the pole at the ground line can be destroyed, and the myriads of germs in the air and in the soil surrounding the pole can be excluded, the pole will be preserved. The only advantage there is in deep penetration when using the old methods is, it requires a longer time for the germicides to be leached or washed out. Mr. Boulton, in his admirable work previously referred to, says: "That the quicker germicides will soak into the pole, the quicker they will volatilize and leach or wash out."

We believe the practical requirements of any successful method of preserving poles must have the following advantages:

1. It must be a method that can be used by large or small companies, having a large or small number of poles to treat.
2. It must be capable of being applied to new or partially decayed poles in the ground.
3. It must not require a large or expensive plant.
4. It must not require highly skilled labor.
5. It must not require the transportation of poles to and from the plant.
6. It must not require more than one treatment, and must be positive and effective and relatively inexpensive.

When we began experimenting over nine years ago with our present method the following facts had been established by scientists and experimenters. That poles commence to decay at or about the ground line; that the cause of this decay is a fungus growth or living germ; that when this germ is killed the decay ceases; that many chemicals will kill wood-destroying germs. It was also known that germicides in solution, held in contact with wood, will be taken up into the pores of the wood by capillary attraction and the osmotic forces.

Recognizing the above facts and conditions, we began experimenting with our present method. Our aim was, not to secure a chemical that was both a germicide and a germ excluder, in and of itself, but to use one or more of the well-known germicides and endeavor to exclude the germs in the air and soil mechanically. To devise a method which would accomplish these results we found to be a very difficult problem. As most germicides which are cheap enough and powerful enough to be used in preserving poles are soluble, the mechanical device must serve three purposes.

It must exclude the germ after the pole is treated and at the same time must retain and protect the chemicals in constant contact with the pole at the ground line; it must also prevent the chemicals from being taken up and absorbed by the surrounding soil.

We first dig down around the pole a distance of about fourteen inches from the ground line and clean off any decayed wood from the surface of the pole (if it is an old pole). We then place a layer of Portland cement mixed with sand around the pole at the bottom of the excavation. Next, place around the pole our hydrobestos jacket one to two inches therefrom, imbedding the lower edge of the same in the cement. The two edges of the jacket are lapped from one to two inches and fastened with a specially prepared cement and tacked upon a lath inside the jacket. We next fill the space between the pole and the jacket with our germicides in a dry state, mixed with sand. We then form around the top of the jacket a reinforced cap or collar made of Portland cement (one part to three and three and one-half of sand). For reinforcing we use one or more wires around the pole imbedded in said cement. (Old telegraph or telephone wire may be used). The collar protects the chemicals and jacket from the action of the rain and snow, and if along steam railroads, protects the pole against the numerous grass fires. The chemicals are slowly dissolved by the natural moisture in the pole, and they pass into the same by capillary attraction. As they cannot pass out into the surrounding ground they go into the pole, thus destroying all fungi and wood-destroying insects. We have, then, a continuous absorption of chemicals and a mechanical exclusion of germs. The hydrobestos jacket is a pure mineral, composed of specially prepared and purified asbestos and asphaltum. This material is subjected to a pressure of about 27,000 pounds per square inch in its manufacture and is a very important factor in our method. There is no animal or vegetable fiber in it and it is practically indestructible in the situation used.

We have used all kinds of metals and materials, but hydrobestos seems to give the best results. In some special locations we form the jacket of cement. The reinforced Portland cement cap is an important part of the protective device. It prevents the rain and snow from entering the receptacle holding the germicides, and gives a stability and attractiveness to the pole.

The collar does not crack owing to the fact that there is practically no expansion and contraction of the pole at the ground line; besides, it prevents grass fires along steam railroads from setting fire to the pole.

Let it be remembered that there is no secret about germicides among scientists. Our aim was to select those that were powerful and effective; that would not injure or weaken the fiber of the wood, and yet were cheap enough to be practicable.

We used hydrated lime, (rock) chloride of sodium mixed with coarse sand and one-fourth to one pound sulphate of copper per pole, according to the size and condition of the pole. Indeed we vary the above proportions somewhat in cases of partially decayed poles according to condition.

We are frequently asked as to the effect of our treatment on unseasoned poles and posts. While we do not approve of the practice of putting poles and posts in the ground while green or unseasoned for many reasons, yet we have treated sycamore, willow, soft maple, cotton wood, Carolina poplar and red oak posts that were cut in the spring and placed

in the ground, which, after three years, showed not the slightest sign of decay, although some of them were cracked above the ground line. Our treatment of telephone and other poles, whether seasoned or unseasoned, have given uniformly good results.

On small jobs the men work in gangs of three. One goes ahead and digs around and cleans the poles, and the other two follow with a one-horse wagon or hand truck containing the chemicals (if the line of poles is along the road or on the streets of a city) and finish the treatment. Or the material may be distributed in small sacks to each pole from a hand car, if along a railroad. One gang of men can treat from twenty to thirty twenty-five foot poles per day. A much larger number of new poles can be treated in a day. The cost of treating this size depends upon the accessibility of the poles and whether the materials are purchased in carload lots or not and the price of labor; but would say the cost would be from seventy-five cents to a dollar per pole, including royalty. We have treated some very large poles, worth from $50 to $75, that cost $1.50 and as high as $2.50 for treatment. Even this will pay, when we taken into consideration the cost of removal and renewal of the pole. These figures may be reduced on large contracts.

According to government experts the open-tank treatment costs sixty-seven cents per pole, not including hauling to and from the plant.

Some little attention has been paid by pole users in the past to the question of the depreciation of their poles and their preservation, that many have not stopped to think or figure what the cost of treatment should be in order to be practicable. We submit, however, that it will richly repay any company to treat their poles at the above cost if thereby the life of the pole can be extended ten or fifteen years or practically doubled.

We have poles which were partially decayed when treated and over nine years show no increase in the decay and the protecting device is in good condition. We have no hesitancy in saying from our experience that poles thus treated will have an extended life of from ten or fifteen years, and, we believe, longer. Furthermore, the pole will retain its full strength, at the ground line during the greater portion of that period. That fact alone is of great advantage in sleet and wind storms. We have treated several thousand poles for different companies with our method, and it has been positive in its action and uniformly effective. In this paper we have not aimed to draw unfair or invidious comparisons with other methods of treatment, but to give an account of our experience in attempting to solve this very serious problem to users of poles. The poles treated speak for themselves, and we invite the closest and most critical examination by engineers and anyone who may be interested.

Causes of Induction from Parallel Telegraph Wires.

A correspondent to "Telephony" asks the following question about induction on his telephone lines: "Suppose a telephone line parallels for a distance of six miles the Western Union telegraph line immediately on the line of the right of way. This line contains one metallic circuit and one grounded line. Would there be induction from the telegraph line, and would this induction be sufficient to impair the working of the telephone line?" In reply to this question the editor says:

"A full reply to your query cannot be made without information as to the system or systems of telegraph working employed on the wires on the Western Union line. It can be stated at once, however, that the common simplex, duplex or quadruplex methods of telegraph working, with direct current from batteries or dynamos, will cause objectionable induction in your grounded line; but the metallic line, if maintained in good condition, may be transposed so as to prevent any noticeable induction.

"As regards your grounded line, the degree or severity of induction will increase with duplex working as compared with simplex, and again with quadruplex working as compared with duplex. This arises from the facts that current reversals are employed in the duplex and higher voltages in the quadruplex than in the duplex or simplex, for lines of the same total length and resistance. You are likely to find that the bells at bridged stations on the grounded line, if delicately adjusted, will respond to duplex or quadruplex signals.

"The telegraph companies are now employing, to some extent, high speed and automatic systems of working, which use rapid impulses with reversed polarities and in some cases alternating currents. These will cause much more troublesome induction than the systems first mentioned. They may even cause induction on your metalic circuit of a severe character and are almost certain to render your grounded circuit useless.

"In case such systems are used on the telegraph line we would recommend that you seek some other location for your line, at least fifty feet distant, or more, rather than less. The pole question of proper minimum separation is not easily treated in a general way in such a brief reply as we must necessarily make. Ordinarily speaking, the amount of induction will increase with the distance of exposure, and it is therefore necessary, in choosing a location, to take into account the probability of future extensions of your line which will increase the length of exposure.

"In the location which you propose, we believe that you will obtain entirely satisfactory service with transposed metallic lines if there are no high-speed automatic systems of telegraphy in use; if such systems, on the other hand, are in use, or likely to be used in the future, we recommend some other location."

Testing and Care of Wires.*

BY V. T. KISSINGER.

Assistant Superintendent of Telegraph of the Chicago, Burlington and Quincy Railroad, Lincoln, Neb.

The value of our wires in service is directly dependent on the percentage of time they are in a working condition, and the amount of business they will carry.

So far as single overhead wires are concerned, the testing and location of trouble is a rather simple matter.

There are, however, various ways of having the local offices perform their part in such location.

In testing telegraph wires, some wire chiefs ask the way stations to come in on the circuit, and try them there. Others ask the way office which way a wire is grounded or open. Both of these methods bring unnecessary moves and delays into the test, as, if some office requested to try the wire does not get the wire chief, he is very liable to do something that will bring in more trouble and make additional testing necessary, or spoil the test then being made. For instance, he may cut in with a defective instrument.

I would suggest that no one be called into the wire, but that the wire chief call on the local office to pull out the east or west plug, to open such a wire as may be grounded or crossed, or to ground east or west, such as may be open, and when the trouble is apparently located between two stations, that an east and west test be made in the board of each of those stations, which will show if the trouble is or is not in the offices. Very many such tests show office trouble that may be cleared by the operator.

In locating an ordinary case of trouble, a good wire chief will not call in any office more than once.

SWITCHBOARD OR INSTRUMENT TROUBLE.

The practice of having the operator remove wires from the posts in the switchboard is not to be recommended, and usually brings about trouble at some later day that is hard to explain. These general rules apply to all testing, and a familiarity with the local conditions is of much value.

Trouble being located and referred to the lineman, the trouble should be tested, or "felt for" hourly, or as often as practicable, and when it is figured out about what time the lineman should reach and clear his trouble, very much more frequent tests should be made.

When cleared, a message should be sent to the lineman at the stations each side of him, to notify of clearance, and advise of other trouble; also of any extra trains, which will help him over the road.

The handling of the lineman has much to do with the amount of trouble and the delay in clearing.

By proper efforts, the amount of ordinary wire trouble may be reduced to the so-called unavoidable, and that trouble due to neglect, will be of a small percentage.

Considering insulation, the train wire is the hardest to maintain in good working condition—being usually the oldest wire—dirty insulators—and being looped into all sorts of buildings.

For the reason that wet weather reduced the working efficiency of train wires, the low resistance relay became popular. That relay had nothing to do with the insulation, but it reduced the resistance between terminals, and provided what might be called a short path between terminals, and a larger per cent. of the current following the line of least resistance, would follow the wire instead of leaking off through the high resistance due to dampness.

The measurement of insulation with the voltmeter, when followed up by having the small escapes removed, has probably resulted in as much benefit as the low wound relay, but the low wound relay furnished immediate relief, while in some cases, several months would pass before the leaks shown by the voltmeter could be removed. Both should be used.

Claims have been made that the insulation figures obtained by use of the voltmeter were not accurate, as compared with bridge measurements. I do not know that any claim has been made that they were accurate, or any reason for a wish that they be nearer than five or ten per cent.

The method is fast and wires may be measured with several stations within a few minutes, with no lost time by reason of interruption, and if the escapes shown by the voltmeter are removed the working circuit will be improved.

TELEPHONE CIRCUITS.

Telephone circuits are cut into the regular telegraph test stations (fifteen to twenty-five miles apart) in such a manner that they may be opened for test; local offices between the test stations are connected on to the main circuit by means of test connectors, so they may be removed and replaced without soldering iron.

The testing of a telephone circuit by telephone and voltmeter is more simple than by the telegraph method because when connected with a wire in trouble, we seem to hear, and at the same time see the trouble; crosses, escapes and high resistance contacts, cross talk and any foreign noise and interference. In the testing, all that is done is to disturb or change these noises.

By reason of the telephone being more sensitive, greater attention should be given to secure good connecting joints, clean arresters and high insulation.

While it is true that a good telephone circuit will work satisfactorily through wet weather that would practically drown a telegraph wire; the insulation on the telephone should not be neglected, because poor insulation, if not properly distributed, will cause a noisy line and metallic circuits being double mileage, should receive more attention.

The two sides of the circuit being connected together through the instruments at every station they appear on the testing instruments as one wire, and cannot conveniently be measured separately.

*A paper read at the convention of the Association of Railway Telegraph Superintendents, at Detroit, June 23-25, 1909.

Copper metallic circuits with twenty-two stations have been measured through wet snow and rain, showing an insulation resistance of less than one million ohms per mile for one hundred and seven miles.

The copper and iron wires in commercial telegraph service on the same poles showing about the same insulation per mile of wire were too heavy to be used.

The telephone circuits worked all right. The despatcher said, "They sound a little different but not much."

In testing for a ground or escape, the two sides of a pair are opened at the test stations, the same as with the telegraph, except that the wire chief does nothing but listens to the changes in the noise or watches the voltmeter.

When one or both sides are open, the test office is asked to short circuit the two sides, which amounts to the same as grounding on a single wire.

There seems to be no reason for the use of a ground wire except to locate high resistance joints.

A high resistance may make a noise similar to that made by an escape on one side, and may be located by short circuiting and grounding at the same time, which may be done at the test stations until it is located between two test stations, after that the lineman with a receiver may be sent out to short circuit and ground the pair, while the wire chief listens.

Unlike an escape or ground, the lineman cannot do his own testing to locate a high resistance.

While the telephone circuit may be a trifle more complicated, and the maintenance cost somewhat higher than the telegraph, we find the telephone has many advantages that were unknown to the telegraph.

Obstacles Encountered in Mountain Railroading.

BY "OLD FARMER" LAWTON OF DENVER.

Constructing Colorado railroads has been anything but an easy task. The expense is great, and the loss of life in blasting through the solid masonry of the Rocky Mountains, has left many an unmarked and unknown grave, but once built the roads are like the rock of ages, and all that is necessary for their safe operation is the power furnished by Colorado's immense coal fields, soon to be supplanted by power generated from our swift mountain streams.

While the wonderful engineering feats accomplished on the Denver and Rio Grande, Colorado Midland, Colorado and Southern and Moffat roads have always been a puzzle to Eastern and foreign railroad constructors, when we go back to the early histories of these roads we find they required much other figuring than hewing granite paths through the narrow mountain gorges or climbing up above timber line to an elevation of over 11,000 feet by circling around a mountain in order to secure an even grade.

Take the Rio Grande for illustration. While the builders had comparatively easy sailing between Denver and Pueblo and up to the Canon City coal beds, almost every other foot was a struggle for a right of way, or "you will have to show me" before foreign stockholders would invest their money.

The late General William J. Palmer, its first president, with well-chosen lieutenants, proved equal in all emergencies. General Palmer's enviable Civil War experience stood him well in hand. His wonderful flank movements were a puzzle to every one until after the object in view was consummated.

Soon after reaching Pueblo the general saw the need of an extension to southern Colorado. His first estimate and recommendations failed to catch the eye of the Holland stockholders. Then a young man, Robert F. Weitbrec, employed in General Palmer's office, was sent south to reconnoiter upon horseback. He was disguised as a cowboy. After a few months in the field Weitbrec returned with indisputable facts regarding the undeveloped coal mines at El Moro and Trinidad, as well as future agricultural possibilities. This was all kept quiet until the reports could be sent over to Holland and the Dutch said, "Yaw, let her speel," but not until the grading camps were distributed along the intended extension did even the citizens of Pueblo know that the little "baby" road was actually growing.

Next came the Utah extension of five hundred miles in 1878. Two years before the great Santa Fe system had fought its way through the Indian hunting grounds of western Kansas and eastern Colorado, making Pueblo its terminal. General Palmer knew that this was only temporary, and early that spring the general, in company with Colonel D. C. Dodge, who later was acknowledged a brigadier-general in railroad building; Dr. W. A. Bell, and a few lieutenants, including Weitbrec, went over to Salt Lake via the Union Pacific route, ostensibly to make Brigham Young a friendly visit, but in reality to feel of Brigham's pulse and ascertain if the Mormons would take kindly to an extension of the Rio Grande into and through their secret territory.

Upon Colonel Dodge's return to Denver he told the newspaper reporters much about Brigham Young's gigantic irrigation canals, and suggested that it might be well for Colorado people to copy that much after the old sinner, but not a word was said about a Utah extension of the Rio Grande, and I have my doubts whether the 2,000-foot perpendicular walls of the Black Canyon and the Royal Gorge would have sheltered a railroad to-day had not General Palmer and his young lieutenants felt uncomfortable after their feast at Brigham Young's Bee Hive home and strolled out for a little walk which brought them 500 miles east, and strange, too, right over what later proved to be the right of way of the Rio Grande between Colorado and Utah.

General Palmer's flank movement worked out very successfully until they began to lower their surveyors with ropes down 2,000 feet into the

Royal Gorge to see if there was room for a narrow-gauge railroad, then the Santa Fe smelled "a mouse," and, thinking the "baby" road might get lost in the mountains, went after it, with the result that both companies placed heavily armed guards at the entrance of the gorge. While a few lives were sacrificed, a greater slaughter was prevented by General Palmer, who headed his own forces and used war tactics in keeping the forces apart as much as possible until the question was amicably settled by the Rio Grande main lines being leased to the Santa Fe for a term of five years.

After the right of way to the only passage into Utah was settled and the Rio Grande rails laid through the Royal gorge, General Palmer, after consulting the state courts, concluded that the forced lease had run about long enough and informed Colonel Dodge that he might resume his old position as general manager of the whole Rio Grande system. That office had been removed to Topeka, Kan., and Colonel Dodge loved Colorado too much to think of migrating to the Sunflower state just for a job, so he took a run down the line, stopping at each station, offering old Rio Grande employes, who had been supplanted by Santa Fe men, their old jobs back, but he was careful to tell them not to report for duty until precisely at five a. m., the following Sunday.

Returning to Denver, Colonel Dodge offered me a position as his private operator, which looked pretty good, as there was not a sign of a wire in his office, and I accepted on a Saturday evening. Soon a lineman came crawling through the second-story window, bringing with him the two Rio Grande wires which he had extended from a neighboring pole. Then the colonel for the first time took me into his confidence by saying that there would be a little change in the operating forces of the Rio Grande the next morning at five, and my duties would be to watch these two wires and note any tip the Santa Fe might get of this intended move.

The colonel sat nodding all night and was very cool at five that Sunday morning. The old Rio Grande employes, including agents, operators, train crews, switchmen and even section men, who had been waiting quietly all night at the different stations, suddenly overpowered the new Santa Fe men and took possession. The "presto chango" was made so quickly and quietly that passengers who had paid their passage to the Santa Fe never realized that they were patronizing an opposition company before ending their journey, and that they were being shot through space by the commands of a new set of train despatchers.

Promptly at five a. m. I began to receive messages for Colonel Dodge from old employes along the line, and all reported that they were " in full and peaceable possession; all quiet on the Rio Grande."

South Pueblo was our last point to hear from and that report was a little late getting in and caused the colonel some uneasiness, but finally they reported to us, saying that the old employes were in possession, had placed new locks on all switches, on the roundhouse and depot and that, aside from a few bruised heads, no damage had been done. Then Colonel Dodge said "Thank God." Seemingly well satisfied with his night's work in handling his loyal little army, he said he would go and get some breakfast.

In constructing the old Denver and South Park road Governor Evans found he had run up against a real stone wall after building his line as far as Morrison, expecting to eventually go up Turkey Creek canon and over the Continental divide, but he was not slow in retreating to Bear Creek Junction and building up through the Platte canon, the most feasible route, as soon as his road was needed farther west.—Rocky Mountain News.

Pole Consumption in 1908.

Statistics relative to the production of forest products are annually collected and published by the Bureau of the Census in co-operation with the Forest Service of the Department of Agriculture, and this advance statement of the number of poles purchased in 1908 is made public at this time in response to the demand for information concerning these important products.

Kinds of Wood.	1908 Number.	1908 Cost.	1907 Number.	1907 Cost.
Total	3,249,154	$5,928,824	3,283,268	$8,081,768
Cedar ...	2,200,139	3,780,973	2,109,477	5,202,617
Chestnut.	516,049	1,227,273	630,282	1,619,617
Oak	160,702	95,032	76,450	60,285
Pine	116,749	382,710	155,960	459,545
Cypress .	90,579	148,070	100,368	307,974
Juniper ...	42,367	83,401	38,925	109,226
Tamarack.	24,123	32,212	13,884	10,247
All other.	98,446	179,153	157,922	312,089

In common with other forest products, the output of poles during 1908, as indicated by the number marketed, showed a falling off as compared with that of 1907. The difference, however, is relatively slight, and had conditions in 1907 extended through 1908 the purchases of the later year would doubtless have reached a total substantially larger than in the preceding year. The most marked decreases were noted in the returns from the groups of purchasers comprising electric railways, light and power companies, and steam railroad companies, the total for the former group in 1908 equaling only seventy-nine per cent. and that of the latter fifty-three per cent. of their reported totals in 1907. These were largely offset, however, by the purchases of telephone and telegraph companies, which exceeded those of 1907 by a considerable margin though the returns of some of the largest buyers in this group carried materially smaller figures for 1908. The percentages contributed to the total purchases in 1908 and 1907 were, by groups, as follows: Telephone and telegraph companies, seventy-nine per cent. and seventy per cent.; electric railroads and electric light and power companies, sixteen per cent. and twenty-one per cent., and steam railroads, five per cent. and nine per cent., respectively.

Special Announcement!

To whom it may concern:

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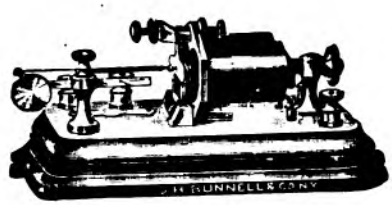

Only with Bunnell Instruments is it possible to get the best results from both lines and operators—Insist on getting them.

We are now making the Hudson Word Register, for counting the number of words written on a typewriter—Send for circular.

Send for our new abridged catalog and confidential discount sheet.

Our prices are very low and you will find many things of interest to you on our lists.

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20 PARK PLACE NEW YORK

Telephone Construction.*

BY J. C. KELSEY.

For several years there has been an insistent cry for standard telephone apparatus. Every effort on the part of any organization toward this object has been met with opposition on the part of the various manufacturers, who seem to have the groundless fear that standard telephone apparatus means the output of one particular factory.

Such fears are not only groundless but foolish. Standardization does not involve apparatus as much as it does the arrangement of it. The demands of standardization are simple, because the consideration alone is balance. A balanced circuit simply means one which will resist extraneous disturbances, and give the transmitting circuit the best possible path.

Transmission is divided into two general groups, the first and possibly the older, is the magneto telephone or local battery method, the other is the common battery method which came into vogue in 1898.

Local battery telephones remind us of steam railroad conditions, in which each unit has its own power of motion. The two dry cells, working with the transmitter, constitute the locomotive feature.

Common battery telephones remind us of electrical railway conditions, in which each motor unit is propelled by a central power. The transmitter, acting with the central battery, constitute the powerhouse and motor feature.

Often managers of telegraph companies, in changing from local to common battery, are disappointed temporarily in the transmission. A local battery telephone, with new cells, may be rated at one hundred per cent. for sake of comparison. The batteries run down enough to lower the local battery efficiency to sixty per cent. A common battery telephone will be constant, and stands in our relative scale at eighty per cent. It is plain that local battery telephones, newly equipped with batteries, are superior to common battery. You can prove it easily.

Telephone service, compared to all other wire transmissions is the most wasteful method. Of all the energy expended in the transmitter circuit, but one-half of one per cent. of it is available at the receiving end. But the telephone receiver is a most marvelously sensitive instrument, and interprets the surviving electrical force as human speech, clear enough to be plainly understood. It teaches us that quality and not quantity is the goal we are seeking.

Local battery telephones are divided into two general classes, series and bridging.

The series telephone has the usual standard apparatus, except the ringer and generator. The generator has a higher armature resistance and greater number of turns, while the ringers are wound to eighty ohms. On a series party line, you are compelled to talk through the inductive resistance of eighty-ohm ringer coils. The damage to transmission can be avoided by bridging a one-half microfarad condenser across the ringer coils.

While the manufacturing output of series telephones equals the four-bar and five-bar telephones, the series telephone may be said to be an obsolete type, from a party line standpoint, because its circuit arrangement is not a balanced one, and it can not cope with extraneous electrical disturbances.

The bridging telephone is an example of the survival of the fittest. The bridging telephone is put out with three, four or five-bar generators, and with 1000, 1600 or 2500-ohm ringers. The standard average type is one equipped with a four-bar generator and a 1600-ohm ringer.

The bridging telephone permits of a balanced line, and is thereby most fit for efficient transmission. There is nothing so disturbing to telephone transmission as a buzz or hum of a distant dynamo. With a well-balanced circuit and insulation in good condition, there is no reason why a bridging line should not be absolutely quiet. We have examples of ordinary perfect lines being made noisy by the series alternating trolley system, and occasionally an accidental ground on the 2200-volt circuit of the average small town lighting system makes all the telephones noisy. However, the latter effect is only temporary. It is a good rule to look up your paralleling power and lighting wires when your own lines are disturbed.

The great trouble with bridging party lines is that someone leaves the receiver off the hook, or too many listen, so that you cannot ring the bells on the line.

This is easily remedied by placing a one-half microfarad condenser in the receiver circuit. This little condenser automatically presents a high resistance to low frequency ringing currents, and a very low resistance path to the high-frequency voice currents.

Do not waste your time on special receivers, or go to the extra expense. The ordinary receivers range from seventy to ninety ohms, and there is very little to gain by increasing the windings. It is just as possible to overdo the thing as it is to do the opposite. The middle ground is usually the best.

Furthermore, the replacement of a special receiver is difficult. Assuming that the special receiver is better, the replacement by a temporary receiver might offer an element of danger, due to poor hearing. It is better to stick to standard devices.

In fact, the farm line usually serving twenty or thirty telephones, not only uses the condenser to help the ringing, but goes farther, and a push button is put in so that the exchange drop or bell may be secretly operated, and connection gotten without alarming all the line subscribers. With this arrangement every subscriber could be listening, and it would not interfere with the signaling of the central office. The condensers help the subscribers to ring each other on such a line. As you have possibly heard, the farm ladies will tie the receiver to their ear so they may knit or peel potatoes and still be familiar with neighborhood affairs.

*A paper read at the convention of the Association of Railway Telegraph Superintendents, at Detroit, June 23-25, 1909.

Three-bar series generators are wound with 330 turns of No. 34 wire, and have 350 ohms of resistance.

Four-bar bridging generators are wound with 3,000 turns of No. 31 wire, and have 150 ohms of resistance.

Five-bar bridging generators are wound with 1,500 turns of No. 30 wire, and have 120 ohms of resistance.

The two latter are built for heavy work, and will easily operate forty ringers on a long line.

For local battery work, transmitters should have a comparatively low resistance and should average close to twelve ohms. One great manufacturing house made its reputation on an eight-ohm transmitter for this service.

You hear considerable argument for high resistance transmitters for this work, but it is all a mistake. There are places where such practice is justified, such as a home where only short calls are made, and it is important to save battery current.

But in railway work, any danger or risk of poor transmission due to effort to save battery would be nothing short of suicidal.

There are two general types of transmitters—the solid back and the so-called reversed type.

One prominent superintendent has compared the solid back to a belted engine and generator, and the reverse type to a direct-connected set.

The reverse type simply incorporates the carbon cup directly in the diaphragm itself. Such a transmitter will not pack, as usuage sets every particle into motion.

The oscillograph reveals that the reverse type, or diaphragm cup type, shows presence of tones not found at all in the solid-back. It is these extra tones that help voice recognition. Voice recognition is one of the prime requisites demanded by railway interests, particularly in train despatching.

One dry cell connected to an eight-ohm reverse type transmitter will do as good work as three dry cells connected to a twenty-four-ohm or more transmitter.

Two dry cells, connected to a twelve-ohm reverse type transmitter, stands to-day as the standard of transmission.

The ordinary two-pole receiver, averaging eighty ohms, is the standard. Keep your devices of standard resistance. They are easy to interchange.

Either hard rubber or composition shells are used —composition shells are used exclusively by the independent trade.

The receiver hook should be punched brass, as should all other parts. The use of steel and white metal should be prohibited where brass can be utilized.

As railroads will use copper for long-distance service and iron for short-haul work, a ringer working its best at 15,000 ohms should be standard. Ringers adjusted for 60,000 and 80,000 ohms will not ring so well.

The generator bars should be carefully rolled by suitable machinery, so that the fibers of the steel will be preserved. It is well known that careless bending of steel will prove ruinous to its electrical and magnetic properties. The armature should have the smallest air gap consistent with good mechanics.

A simple lightning arrester should be used, either on the telephone or near it, on account of the feature of contributory negligence being held against your company. You know everybody considers a railroad a just victim. People want railroads to come to them and make their property valuable, and then want them to support them, too. Too much attention cannot be paid to the question of lightning protection.

The subscriber's induction coil should have a primary winding averaging thirty-five hundredths of an ohm, and a secondary of thirty-five ohms. The winding should also be impregnated with paraffine in vacuum. This will help to resist burn-outs from divers causes.

The operator's induction coil has a primary winding of thirty-five hundredths of an oh mand a secondary winding of two hundred ohms. The high resistance of the secondary is necessary, because the operator would otherwise have a bad cutting down effect when listening in on a conversation.

COMMON BATTERY TELEPHONE SYSTEMS.

There are two general classifications, the repeating coil system used by Bell interests, and the retardation-condenser method used by the independent interests.

The repeating coil method may be properly called an "electromagnetic system," while the retardation-condenser system may be described as the "electrostatic method."

There is no difference in transmission between the two systems.

Common battery systems connect with long-distance lines by means of a repeating coil and condenser arrangement. This recalls the well-known law that telephone systems of different characteristics should only be in inductive relation, otherwise balance will be disturbed and other disturbing factors will enter in.

Some systems use forty volts, some thirty, others twenty-two and some twenty. The results are identical as each system equalizes the resistance of its retardation coils. These retardation coils individualize the circuits, and thereby prevent cross-talk.

In toll connection, it is customary to increase the amount of battery flow to subscribers' telephones. In other words—the local subscriber talk does not require as much current as the long-distance connection.

The average resistance of the common battery transmitter is one hundred ohms.

PARTY LINE SELECTIVE RINGING.

If a terminal switching system is desired, and economy of wire space is necessary, the harmonic system of selective ringing is recommended.

The harmonic system makes use of four frequencies—16 2-3, 33 1-3, 50 and 66 2-3 cycles per second.

Immunity from the Elements

The Okonite Company Ltd.

253 Broadway New York

The ringers are of the polarized type, and the attunement is effected by different weights of bell tappers.

Four full metallic stations can be used without any interference between stations.

If it is found that eight stations are necessary, the earth can be used as a return, and each of the eight stations can be called without disturbing the others.

This system has been in use for two years in the Rock Island yards of Chicago, and the switchboard being placed in a central position, made some most remarkable wire economy.

The harmonic selective system is, of course, confined to telephone switchboard service.

TRAIN-DESPATCHING TELEPHONE APPARATUS.

Such apparatus is necessarily confined to long lines, and the service somewhat resembles a heavily-loaded party line. It is essential that such service be selective.

The apparatus for transmission purposes is the standard apparatus used by telephone companies.

Such systems must be of a bridging nature, since any series arrangement for telephone purpose is foreign to modern demands. Not only does a series arrangement have a bad effect upon transmission, but there is an added danger from lightning destruction. Each side of the apparatus has to be protected.

The bridging system is the outcome of years of experience, and stands as a climax, not only in telephone matters, but in all electrical usages.

The present methods of wire transmission can hardly be said to be permanent. Some day devices will be made which will deal with more tangible current values and step-up and step-down methods can be made use of. We are approaching nearer a real long-distance power proposition, where we can raise pressure values and lower them, and offset the effects of capacity just as in power practice an over-excited synchronous motor offsets impedance.

Electrical engineering deals with currents of one frequency—either, twenty-five, thirty-three, forty, sixty or one hundred and thirty-three cycles per second, but in each case always singly.

Telephone engineering deals with electrical currents of many frequencies, each one acting individually and separately, and each one performing its own particular duty.

When one imagines all frequencies, ranging from fifty to five thousand cylces, surging along as electrical currents, he has reason to wonder how any intelligible sound can be carried.

The higher frequencies succumb to the capacity of the line more readily than the lower ones, hence conversation through commercial cable is limited to thirty-five miles and 1,200 miles on open wire, because of the fact that these numerous currents do not finish as they start. In other words, they become distorted. Hence the failure to recognize voice or to interpret speech.

To overcome this the Bell interests use a Pupin coil, which is a device for offsetting the distributed capacity of a telephone line by means of distributed impedances, thereby giving the lower frequencies the same chance to finish as the higher ones.

However, much opportunity is offered for improving telephone apparatus, and however much revolutionary invention the mind can contemplate, we may be assured that voice transmission is the final and highest point in the evolution of communication.

The Difference Between the Trouble Shooter and the Division Lineman.*

BY H. D. TEED.

Superintendent of Telegraph of the St. Louis and San Francisco Railroad.

The Topics Committee has called upon me to present a paper explaining the difference between a "Trouble Shooter" and a "Division Lineman." While these two terms may seem to be synonymous, there is quite a difference in the duties and qualifications of the two men.

The trouble shooter has a great advantage over the division lineman, inasmuch as he has at all times means of direct personal communication with the wire chief, while the division lineman must depend upon an intermediary, and possess absolute confidence in the wire chief. The trouble shooter is invariably assigned regular hours and observes them, while the division lineman responds almost instantly on receipt of notice of trouble, whether it be day or night. So long as the trouble shooter holds no notice of trouble he does not worry. Not so with the division lineman; he must anticipate the possibility of interruptions and remove the cause before valuable circuits are lost to the service.

The picturesque term, "trouble shooter," seems to have originated with, and is confined almost entirely to telephone practice. The duties of this position are principally to remove trouble on the telephone line, wherever it exists either on the outside or the inside. He may be given the location of wire trouble by the wire chief, usually after a bridge test, showing the location of the fault, its nature and the circuits involved. He may also be called upon to repair a defective telephone instrument or replace a blown fuse. This work done, he receives an O. K. from the wire chief, makes a work report, and there his responsibility ends.

The physical condition of the line does not interest him, although if he is a good workman, a bad piece of line or faulty construction would no doubt elicit a remark from him to his superior, which would be reported and acted upon by another division of the maintenance department. With large telephone companies it is frequently the practice to have employes whose particular duty is to install the telephone after the construction department has built the line up to the new station. Their work in turn is checked by an inspector, who O. K.'s it or makes an adverse report as to the character of the work.

*Paper read at the Convention of the Association of Railway Telegraph Superintendents, Detroit, June 23-25, 1909.

The qualifications of the trouble shooter are as follows: Sufficient knowledge of line construction to locate accurately any particular circuit and make neat and substantial repairs on the line in conformity with construction and repair rules; familiarity with the rudiments of telephone cable connections; familiarity with instruments in use by his employing company. Physical strength can be sacrificed to mental quickness as his labors do not call for the use of great physical force.

Let us now turn to the division lineman, who is made a part of this discussion. What are his duties, qualifications and responsibilities? This is perhaps best answered by using a concrete illustration which is no doubt typical of the telegraph maintenance force on many of the larger railroads.

The division lineman should be intelligent and fairly well educated, able to write a legible and comprehensible letter; he should be sufficiently strong physically to handle heavy work which the exigencies of the service may require; possess a fair electrical knowledge; and be familiar with telegraph and telephone apparatus so that he can promptly repair ordinary defects. Without these requisites you will find a man in the service whom it will be necessary to pass by some day when selecting a general foreman and seeking a man for promotion. So much for the man.

What, then, are his duties and responsibilities? As most of the Railroad Companies work under reciprocal contracts with the Telegraph Companies whereby the telegraph line is to be maintained by the Railroad Company in return for certain considerations, it is readily seen that some arrangement must be made to handle the work in a systematic manner. This organization usually consists of a general foreman or chief line repairer, who reports to the superintendent of telegraph and has immediate supervision over the division lineman as well as the repairs and maintenance of the pole line.

To the division lineman falls the responsibility of repairing breaks and other interruptions to the telegraph wires reported to him by a wire chief having charge of the wires in his particular territory. This is his paramount duty; and in case of unusual damage to the line due to sleet storm, wash-out or other cause, he must cover the affected territory and make prompt report of conditions, advising what additional assistance and material are needed and direct such labor as he can command, until relieved. It is under such circumstances that we recognize most fully his merit. Second, the current or general repairs, such as replacing broken glass, renewing poles and cross arms where necessary, cutting out bad joints where found, pulling up slack, trimming trees adjacent to the pole line where interference may cause serious leaks, and remedying numerous faults to which the telegraph line is subject. He should observe his line closely and promptly report contemplated telephone crossings and other encroachments on the railroad right of way.

He should inspect each office in his district each month, if possible, and should not allow over two months to intervene between inspections of any office, reporting the condition of the office to the superintendent of telegraph through the division operator and general foreman so that any unauthorized changes may be promptly corrected to prevent future trouble. He is also required to inspect the local batteries and see that they are renewed when necessary and that a sufficient amount of material is on hand to renew them. He is required to see that no instruments other than those authorized are used, or any connections made to the switchboard or other apparatus that have not been authorized, that the switchboard is correctly marked as to wire numbers and directions, that all connections on the switchboard are tight, and that the ground is efficient.

He will be called upon by the division operator, with the knowledge of the wire chief, to open and close offices, and will be given the disposition of instruments and other equipment. He must possess sufficient knowledge of his territory and the local conditions to enable him to determine before leaving his headquarters what material will be necessary in order to cut in an emergency office promptly.

He should be located at a point with due regard to the train service, and where he will be able to reach any point in his territory with the least possible delay. Other things being equal, it is preferable to locate his headquarters at a point where he has the main battery to maintain. Where the main battery is not maintained by the Telegraph Company at its exclusive offices and where it is necessary to maintain a large number of gravity cells, this work falls to the division lineman. He is required to keep the main battery in good condition at all times and keep sufficient material on hand for complete renewals at stated intervals, also to look after the battery refuse, and when a sufficient amount has accumulated to notify the proper authority for instructions as to its disposition. On some roads he is also required to distribute the local batteries for stations on his division. This in itself is no small task. While he should see that there is a sufficient amount on hand for renewals, at the same time, he must not be extravagant in the distribution, as this material is frequently lost or stolen if allowed to accumulate at any station.

He is also provided at his headquarters with a supply of line material for making current and emergency repairs, and it is his duty to see that this stock is replenished from time to time. This is best accomplished by the rendition of a monthly statement showing all material on hand, work contemplated for the succeeding month and what is needed.

From the foregoing it will be readily seen that the division lineman has a multiplicity of duties and responsibilities which require the exercise of considerable mechanical skill as well as the possession of a variety of knowledge. It is necessary for him to be more expert than his predecessor of a few years ago and he will in all probability be required

(Continued on page 497).

Important Subjects Treated in Back Numbers.

TELEGRAPH AGE has published the best articles on telegraphic subjects that have ever appeared in print. Herewith are enumerated a few of the most important subjects treated, together with the date of the papers containing the same. Copies of these back numbers may be had at twenty-five cents apiece upon application. Address J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

British System of Timing Messages ..... Dec. 1, 1902
Buckingham Long Distance Page Printing Telegraph.... Sept. 1, 1902
Barry Page Printing Telegraph ..... Apl. 1, 1903
C. K. Jones' Automatic Telegraph Circuit Protector and Signaling Machine ..... June 16, 1902
Collins Overland Telegraph ..... May 16, 1903
Crehore-Squire Automatic Telegraph System..... May 16, 1902
Definitions of Electrical Terms,
Mch. 16, Apl. 1-16, June 1, July 1-16, 1904
Earth Currents ..... May 1, 1903
Engraving of Clarence H. Mackay ..... Nov. 16, 1902
Engraving of Col. Robert C. Clowry ..... Apl. 16, 1902
Engraving of the Late John W. Mackay ..... Aug. 1, 1902
Field's, S. D., Quadruplex ..... May 1-16, 1904
Ghegan's Automatic Repeater ..... June 1, Dec. 1, 1903
Ghegan's, J. J., Multiplex System ..... Aug. 1, 1904
K. R. Law as Applied to Quadruplex Circuits..... Jan. 1, 1904
Postal Telegraph-Cable Company, History of (with portraits of officials) ..... Feb. 1, 1904
Postal Telegraph-Cable Company Rules Governing Construction and Repair of Telegraph Lines, Apl. 1-16, May 1-16, 1904
Printing Telegraph Systems, Story of ..... Jan. 1, 1903
Progress of Telegraphy During Last Thirty Years, W. Mayer, Jr. ..... Mch. 16, 1904
Protection of Telegraph or Telephone Lines When in Hazardous Proximity to High Speed Lines ..... June 1, 1904
Repeaters.
Atkinson ..... Feb. 16, 1902
Half-Milliken ..... Feb. 16, 1902
Horton ..... Mch. 1, 1902
Defective Loop ..... Mch. 1, 1902
Double Loop ..... Mch. 16, 1902
Milliken ..... Jan. 16, 1902
Nelson ..... Feb. 1, 1902
Weiny Phillips ..... Feb. 1, 1902
Wood Double Loop ..... Mch. 16, 1903
Rowland Printing Telegraph System..... Sept. 16, 1903
Scott-Phelps-Barclay-Page Self-Winding Ticker..... Oct. 1, 1903
Specifications in Construction of 25-foot Pole Line, American Telephone and Telegraph Company... Feb. 16, Mch. 1-16, 1904
Type-Telegraph (Dr. Cardwell), F. J. Swift..... June 1, 1905
Western Union Telegraph Company, History of (With portraits of officials) ..... Jan. 16, 1904
What Constitutes a First-Class Operator ..... Oct. 1, 1904
What Constitutes a First-Class Chief Operator..... Nov. 1, 1904
What Constitutes a First-Class Manager..... Nov. 16, 1904
What Constitutes a First-Class Superintendent..... Dec. 1, 1904
What Constitutes a First-Class R. R. Operator..... Dec. 16, 1904

Churcher Rectifier, J. P. McCabe ..... May 1, 1906
Fire Alarm Telegraphs, History of ..... Aug. 16, 1906
Morse Patents, Covering Invention of Telegraph..... Dec. 16, 1906
Murray Automatic Page-Printing Telegraph, History of.. Sept. 16, 1906
Telegraph Tournament, International, at Boston,
May 1-16, June 16, July 16, 1906
Testing by Voltmeters and Ammeters, F. W. Jones..... Nov. 1, 1906
Wright Keyboard Transmitter and Printer, R. Hitchcock.. Apl. 1, 1906

Automatic Telegraphy—Various Systems Discussed.... Dec. 1, 1907
Dean Rapid Telegraph System..... Aug. 16, 1907
How to Make a Telegraph Company Popular.
Feb. 1, 16, March 1, 16, 1907
Rowland Telegraphic System ..... May 1, 16, 1907
Steno Telegraphy ..... June 16, 1907

Alphabets Telegraph..... Feb, 1, 1908
Anniversary Number, Twenty-fifth Year, Containing Full-Page Engraving of Officials and History of Various Telegraph Companies.... Jan. 1, 1908
Barclay Ptg. Telegraph System (serial) June 16, 1908, to March 1, 1909.
Commercial Cable Company..... Jan. 1, 1908
Composite Telegraph and Telephone Systems—E. R. Cunningham ..... July 16, 1908
Creed Receiving Perforator..... Nov. 16, 1908
Great North Western Telegraph Co., History of and Portraits of Officials and Principal Managers ..... Jan. 1, 1908
Maver, Wm., History of Atlantic Cable..... Oct. 16, 1908
Mercury Arc Rectifier..... Sept. 1, 1908
Military Telegrapher in the Civil War Apr. 16, 1908 to date
Patent in U. S.—How to Secure One..... Nov. 16, 1908
" Law in Great Britain..... Apr. 1, 1908
Pension Fund for Military Telegraphers, Carnegie ..... Jan. 16, 1908
Polyglot Stenocode ..... May 1, 1908
Poles, Preservative Treatment of, by Open Tank Process ..... Jan. 1-Feb. 16, 1908
Poles, Arborvitae, for Telegraph Purposes.. Feb. 16, 1908
" Experimental Treatment of..... Mch. 16, 1908
Rugh's Composite Telegraph and Telephone System ..... May 1, 1908
Simultaneous Telephony and Telegraphy..... May 16, ... June 16, July 1, Sept. 16, Nov. 1, 1908
Telephony for Railways.—W. E. Harkness.. July 1-16, 1908
Train Despatching by Telephone..... May 16, ... June 16, July 1, Sept. 16, Nov. 1, 1908
Wire Chief, How to Become a.. Jan. 16, Feb. 1 and 16, 1908

By taking a little trouble, when Telegraph Age first comes to hand, it may be preserved to form a permanent and valuable addition to the reading matter of a kind which all telegraphers should be supplied. We furnish a neat and attractive cloth board binder, which will be sent by mail, prepaid, for $1. It has good, strong covers, on which the name Telegraph Age is stamped in gold, and means by which each issue may be securely held as in a bound book. One binder may thus be made serviceable for a number of years, and when successive volumes, as they are completed, are bound in permanent form, the subscriber ultimately finds himself, for a moderate cost, in possession of a most valuable addition to his library, embracing a wide variety of telegraph, electrical and general information.

The publisher of Telegraph Age urges upon subscribers to this journal the desirability of having the paper sent to their home address rather than to their place of business. The reason is obvious. If it goes to your home it reaches you without danger of obstruction or abstraction by your office associates who are sometimes prone to borrow your copy to your discomfiture and their edification, but at your expense. This naturally is a source of irritation and of course you don't like it. If a man wants Telegraph Age he should pay for it, and the individual who is paying for his copy should be guaranteed in his rights.

As we regard our subscribers as our friends, and believe we are supplying them with a telegraph paper the like of which does not elsewhere exist, we dislike to see them disappointed, and wish to protect them in their prerogative so far as we are able. We believe that a good many disappointments of non-receipt of the paper might be averted if our suggestion of sending it in all cases to the homes of its subscribers were adopted. Changes of address will be made as often as desired.

Directory of Annual Meetings.

Association of Railway Telegraph Superintendents meets at Los Angeles, Calif., May, 1910.

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

Gold and Stock Life Insurance Association meets the third Monday in January, at New York.

Great North Western Telegraph Company meets the fourth Thursday in September, at Toronto, Ont.

International Association of Municipal Electricians meets at Young's Hotel, Atlantic City, Sept. 14, 15, 16, 1909.

Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, will meet at Fort Pitt Hotel, Pittsburg, Pa., Aug. 17, 18, 19.

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

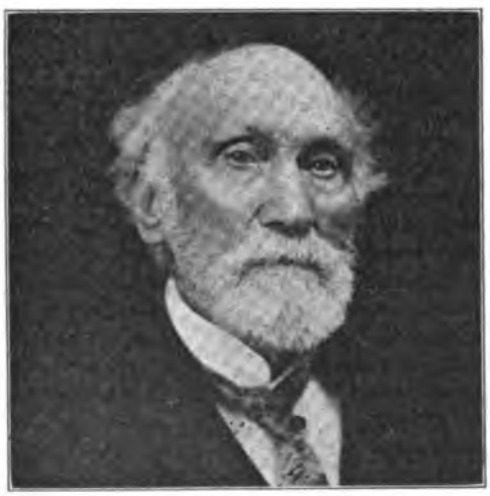
Telegraphers' Mutual Benefit Association meets the third Wednesday in November, at New York.

Train Despatchers Associations meets in Spokane, Wash., June 21, 1910.

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

Death of Orrin S. Wood.

Orvin S. Wood, the pioneer telegrapher, died at his summer home in Turner, N. Y., June 22, aged ninety-one years. Mr. Wood was born at Sherburne, N. Y., Dec. 14, 1817. In July, 1844, he became a student of telegraphy under Professor Morse on the original telegraph line which was opened that summer between Washington and Baltimore. After mastering the new art he engaged in the construction of a telegraph line between New York and Philadelphia in 1845. The next year he completed the telegraph line from New York to Buffalo, known as the New York, Albany and Buffalo line. In 1847 Mr. Wood became superintendent of the Montreal Telegraph Company, and later general superintendent, remaining with that company until 1866. He next went to Milwaukee where he became actively engaged in the building up of the Northwestern Telegraph Company, and after two years work with this company the property was advantageously leased to the Western Union Tele-



ORRIN S. WOOD
New York

graph Company. Mr. Wood has not been actively engaged in business for the past thirty-five years, and while it was known that his health was not of the best his death came as a shock to his many friends who grieve at the passing away of one who was actively engaged in telegraph work from its earliest inception.

A Tribute to Orrin S. Wood.

BY HARVEY P. DWIGHT OF TORONTO.

"On Tuesday, June 23, I received a message dated Turner, N. Y., from Holton Wood, saying, 'My father passed away peacefully last night,' and I also received a message from my friend, Colonel Robert C. Clowry, giving me similar information.

"I came as a very youthful operator to Mr. Wood, who had been appointed Superintendent of the Montreal Telegraph Company's line just erected between Montreal and Toronto in August, 1847, and remained with him in the Montreal office until 1850, when he sent me to take charge of the Toronto office and the Western extensions which were being started in different directions,—the beginning of a system since grown to be a network of lines covering the Province of Ontario.

"Since Mr. Wood's retirement from the business in 1862, and his return to the United States, I have been in constant correspondence with him up to the end of April. Early in the Winter he wrote me that he hardly expected to live through the season. On April 28th, he wrote me that he had only been able to be out three times during the Winter, that he had just been out taking a drive through Central Park in a taxicab, and was eagerly looking forward for the warmer weather which he thought was surely at hand.

"Mr. Wood received his instructions as an operator directly from Professor Morse in 1844, and was his first pupil—an honor and privilege which his after life fully justified—and it may be properly said that every 'Morse' operator living may feel honored in the memory of such irreproachable characters as those of Professor Morse and Orrin S. Wood, the first and chief progenitors of a business since grown to such a marvelous extent, and which has done so much to facilitate the business and promote the happiness of the world. Although it is half a century since Mr. Wood's retirement from the Canadian business and his return to the States, his memory is still cherished not only by the very few still living who had the honor of his personal acquaintance, but his name is still a familiar household word among the Canadian telegraph fraternity, who never saw him, and only know of him by tradition.

"In the death of Mr. Wood, I feel that I have lost the best and dearest friend I ever had or can expect to have. He was utterly and hopelessly blind to the faults and follies of my youthful days, and since his retirement and return to the States our friendship has grown and ripened with our increasing years and constant intercourse.

"I am sometimes called by the Canadian papers of these latter days the 'Father' of Canadian Telegraphs, but I never fail to tell my friends that whatever may be said in this respect, the 'Grandfather' of the Canadian Telegraph System was Orrin S. Wood."

(Continued from page 494).

to extend his knowledge still further with the extensive introduction of the telephone in railroad work, which is now becoming quite general; while it would seem that the requirements of his brother, the trouble shooter, will not have changed to any great extent.

The thought naturally arises, which of these two men has the better opportunity for advancement? In my opinion the advantage rests with the division lineman. During his service as division lineman, he has acquired a knowledge of railroad business, and having come in almost daily contact with the division officials, who are usually ready to recognize efficiency, his opportunity for advancement depends almost entirely upon his aptitude to absorb knowledge and ability to apply it. On the other hand, the trouble shooter may have gained a vast amount of knowledge in connection with his particular line of duties, but the avenues open to him for advancement are few and far between. He seldom comes in contact with the officers of his company and rarely has an opportunity to demonstrate to his superiors his knowledge.

I think that all will agree with me that within a short time the difference between the trouble shooter and division lineman will be plainly apparent to all.

The Miniature Sounder at the Carnegie "73" Dinner.

The miniature telegraph sounder presented to each of the guests at the "73" dinner tendered recently by telegraphers to Mr. Carnegie, in New York, in honor of his seventy-third birthday, aroused much enthusiasm. The device was regarded as an eminently fitting souvenir of an occasion which drew together in the spirit of auld lang syne so many distinguished members of the craft, past and present, especially so as it was a perfect piece of mechanism and fully capable of performing the work required of a like instrument of normal size. The little affair, which is beautifully finished, was highly prized by the recipients at the dinner as being emblematic of the profession. Indeed, such was the interest shown that numerous inquiries have since reached Telegraph Age requesting to know if it was possible to procure duplicates of the same.

In recognition of the sentiment that has prompted these inquiries, the utility of the device itself, and its appropriateness as a holiday gift to and by a telegrapher, Telegraph Age has made arrangements by which it can fill all orders for the same. The key alone, the smallest ever manufactured and which is the same as the one presented at the memorial reunion of the Old Time and Military Telegraphers in New York in 1905, will be sent in a box to any address, carrying charges prepaid, on receipt of $1.50; the sounder at $2.50, or both at $4.00. Address J. B. Taltavall, Telegraph Age, 253 Broadway, New York. An advertisement of this key and sounder appears elsewhere in this issue.

LETTERS FROM OUR AGENTS.

New York, Western Union.

Mr. H. C. Worthen, night chief operator has returned from a trip to the mountains.

Miss Frances Gannon, formerly of this department, was married to Mr. Wm. McNamara, professor of physical culture for the Board of Education and also formerly of this office, on June 16.

Miss Dora Karlein, of this office, was married to Mr. Joseph Gschwind, general night traffic chief on June 12.

Mr. Maurice D. Schaeffer, for many years in charge of the complaint bureau, has resigned and is now conducting a hotel near Bellmore, Long Island, where quite a few of the fraternity are spending the summer.

Miss Anna K. Sullivan has resigned to take a three months' trip abroad, in quest of health; the visit will include Great Britain and Ireland. Miss Sullivan was exceedingly popular as was evidenced by the presentation to her of a handsome floral token of esteem, just prior to her sailing.

Miss Gertie McMullen has accepted a position at Normandie by the Sea, as operator and stenographer.

Mr. Martin Durivan has assumed the chief operatorship at Long Branch, N. J., where he has had charge for over twenty years.

Philadelphia, Postal.

A meeting of the telegraph department of the Pennsylvania Railroad Company was held at the Annex on June 5. A large number of employes from all departments were present. Mr. Howard Small, electrical engineer of the F. Teller Manufacturing Company, delivered a lecture on "Power Machines" which proved very interesting and instructive. Dr. Paul R. Heyl, of the Boys' High School, also gave an address on the "Pupin Loading Coil." Before the meeting closed there was a general discussion, in which many present participated, on the subject of "Maximum Crookedness Permissible in Telegraph Poles." This closes the series of meetings for this season. The officials are very well pleased with the success attending these meetings and will continue them after the summer months.

E. H. Locke, night chief operator, has the sympathy of the fraternity in his recent bereavement in the loss of his father.

The following are new arrivals in the local office: John Schuster, of Scranton; John C. Lindsay, of Cleveland; John A. Ryan, lately from West Jersey and Sea Shore Railroad, and P. N. Gagen, of Philadelphia.

Other New York News.

Assessment No. 494 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Harvey D. Ross, at Baddeck, N. S.; George L. Pine, at Baltimore, Md.; George S. Blank, at Central Islip, N. Y.; Alfred J. Phillips, at Hematite, Mo., and Daniel D. Devereux, at Duxbury, Mass.

Obituary.

R. E. Harper, a well known old time telegrapher, of Atlanta, Ga., died in that city June 15.

David I. Carson, aged sixty-seven years, for many years secretary and treasurer of the Southern Bell Telephone Company, Atlanta, Ga., died on June 7.

Walter C. Britton, aged forty-five years, and who was for many years until 1906 connected with the Pere Marquette Railroad, beginning as a telegraph operator and rising through various positions to that of district passenger agent, died at Saginaw, Mich., June 17.

Mrs. Mary E. Smith Buell, aged seventy-eight years, the only female member of the Society of the United States Military Telegraph Corps, mention of whose admission to membership in the Society was made in our June 1 issue, died at her home in Norwich, N. Y., June 4.

Telegraphers' Aid Society Quarterly Report.

The New York Telegraphers' Aid Society's financial report for the quarter ended June 6 is as follows:

Balance on hand March 6, 1909		$22,908.85
Receipts		1,658.00
Total		$24,566.85
Disbursements.		
Sick benefits	$780.35	
Death benefits	100.00	
Expenses	211.69	
		$1,092.04
Balance on hand June 6		23,474.81
Total		$24,566.85
Relief Fund.		
Balance on hand March 6, 1909		$4,336.32
Receipts		6.80
Total		$4,343.12
Disbursements		43.45
Balance on hand June 6		$4,299.67
Total		$4,343.12

General Mention.

Mr. John Minahan who for twenty-seven years has been in the employ of the Western Union Telegraph Company, at Troy, N. Y., has resigned to engage in the hotel business.

Mr. W. H. Stansell, who for several years has been manager for the Western Union Telegraph Company, at Johnson City, Tenn., has resigned to become manager of a steam laundry in that city.

Amos L. Bougher, agent for the Long Island Railroad Company at Amangansett, L. I., and for many years an operator in the Western Union service at New York, has resigned his position and accepted one with the Canadian Pacific Railroad as relief operator, with headquarters at Kenora, Ont.

Ex-telegraphers play a very important role in the development of the new town of Jerome, Idaho, the premier city of the North Side Twin Falls irrigation project. Among those active in the development of this town who at one time were connected in various capacities with the different telegraph and telephone companies are: C. F. Annett, Chicago, vice-president of the Commercial Club; Norman Annett, Chicago, dealer in cigars, stationery, etc.; James Summers, Iowa, harness dealer; H. Bestow, Chicago, farmer, and John Schmershall, Chicago, physician.

Jerome is a lively, booming one-year-old town of 1,200 people, surrounded on all sides by mountains covered with everlasting snow. Alfalfa and grain are growing and young orchards are now in bloom where once the jack rabbit, coyote, rattlesnake and sage brush held supreme.

Within the next month the residents of this thriving town hope to incorporate as a city, and at that time C. F. Annett, well known to the telegraph profession, and until about a year ago manager of the Western Union Telegraph Company at New Haven, Conn., will probably become the first Mayor.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the key much easier. Price, fifteen cents.

J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

CATALOGUE OF BOOKS ON THE TELEGRAPH.

ABERNETHY, J. P.—The Modern Service of Commercial and Railway Telegraphy, in Theory and Practice, including the Railway Station and Express Service; arranged in Questions and Answers; $2.00.

BATES, DAVID HOMER.—Lincoln in the Telegraph Office; Recollections of the United States Military Telegraph Corps during the Civil War; 432 pages; illustrated; price $2.17.

BELL, JAMES, A.I.E.E.—Submarine Cable Telegraphy; 63 pages, 39 illustrations; 75 cents.

BRIGHT, CHAS.—Submarine Telegraphs; 800 pages; $25.

BRIGHT, CHAS.—Story of the Atlantic Cable; 220 pages; $1.00.

BRIGHT, CHAS.—Life Story of Sir Charles Tilston; $5.00.

CROCKER, F. B., AND WHEELER, S. S.—The Management of Electrical Machinery. Has a special chapter by H. A. Foster. Contents: Descriptions and Directions; Examination, Measurement and Testing; Localization and Remedy of Trouble in Dynamotors and Motor Generators. Fully illustrated; $1.00.

CROTCH, ARTHUR.—Hughes and Baudot Telegraphs; 83 pages, 41 illustrations; 75 cents.

DODGE, G. M.—The Telegraph Instructor. This volume, now in its fourth edition, is admirably designed for the student and beginner, for in explanation and illustration it is clear and profuse; 260 pages, $1.00.

GRAY, ANDREW, LL.D.; F.R.S.—Life of Lord Kelvin; 326 pages; $1.25.

HERBERT, T. E.—Electricity in its Application to Telegraphy. A Practical Hand Book Covering the Syllabus of the New Technical Examination. Adopted by the English Post Office Telegraph Department. Fourth edition, with forty-eight illustrations; $2.60.

HOBBS, W. R. P., AND WORMELL, R.—The Arithmetic of Electrical Measurements; 50 cents.

HOUSTON, E. J.—A Dictionary of Electrical Words, Terms and Phrases; 980 pages; 582 illustrations; $7.00.

HOUSTON, E. J.—A Pocket Dictionary of Electrical Words; cloth, $2.50.

JONES, WILLIS H.—Pocket Edition of Diagrams and Complete Information for Telegraph Engineers and Students. This standard work has been carefully revised and 74 pages and 30 diagrams added, including full descriptions of the newest apparatus lately adopted by the Western Union and Postal telegraph companies. It presents the finest study of the complex subject of the telegraph ever published; it explains clearly the equipment of a modern telegraph office, and is a text-book that no student, operator, engineer or official, no matter what his grade, can afford to be without; 334 pages, 52 chapters, 160 illustrations; $1.50.

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It will be seen at a glance that such chapters as these fully cover the modern apparatus found in the telegraph offices of to-day. Copies of this book can be obtained from us at $1.50 each, express charges prepaid. Address J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

As there are only a few copies of this important work on hand and as a new edition of the book is not contemplated, it will be well to secure a copy before the supply is exhausted.

A New Edition of Maver's "American Telegraphy."

A new edition of Maver's "American Telegraphy and Encyclopedia of the Telegraph" is now ready for delivery. This will be known as the 1909 edition. The more important additions to the work at this time are descriptions of the Murray Printing Telegraph as now used in Europe, and of the Barclay Long Distance Printer, as operated on the lines of the Western Union Telegraph Company. This standard work on telegraphy now contains 668 pages and 492 diagrams. The new edition comes out in a new and distinguishing cover of dark green cloth. This book is a library on telegraphy in all its branches. It is used as a text-book in some of the largest universities in this country. It is written in plain English and practically without recourse to mathematics; hence it comes within the comprehension of the veriest beginner. No aspiring telegrapher 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 Age, 253 Broadway, New York.

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A Semi-Monthly Journal Devoted to Land Line Telegraphs, Submarine Cable Interests and Radio-Telegraphy

Office of Publication: 253 BROADWAY, NEW YORK

ESTABLISHED 1883

Single Copies 10 Cents { For Yearly Subscription Rates See Editorial Page

No. 14 NEW YORK, JULY 16, 1909. Whole No. 628.

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TELEGRAPH AGE

No. 14. NEW YORK, JULY 16, 1909. Twenty-sixth Year.

CONTENTS.

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

A Permanently Adjusted Repeater.

No doubt the average reader will be hard to convince that it is possible to construct a single line repeater that requires no further attention after once being properly adjusted, yet we have the word of our old and well-known friend, Mr. Fred Catlin, the inventor, that the repeater herewith described is practically a permanently adjusted device, and has already made a record to that effect on a severe night many years ago, when all other types of repeaters demanded almost constant attention.

The repeater was connected in a leased press circuit between Washington and Boston, and Mr. Thomas Kennedy, then night chief operator at 195 Broadway, where the repeater was located, turned in a report that, although that circuit was as changeable as the others during the storm, it was the only repeater that required absolutely no attention and was in constant operation from five-thirty p. m. until three a. m.

Mr. Anson Stager, vice-president of the Western Union Telegraph Company at the time, immediately made satisfactory terms with the inventor and the repeater then became the property of the company.

Unfortunately this set of repeaters, which was specially-constructed apparatus, was destroyed by fire the next day, and although new apparatus was promised, there were so few permanent circuits demanding improved repeater service that the project was put off from time to time until possibly forgotten.

Now that good repeater service is becoming more and more important each day owing to the growing number of leased wires, we understand

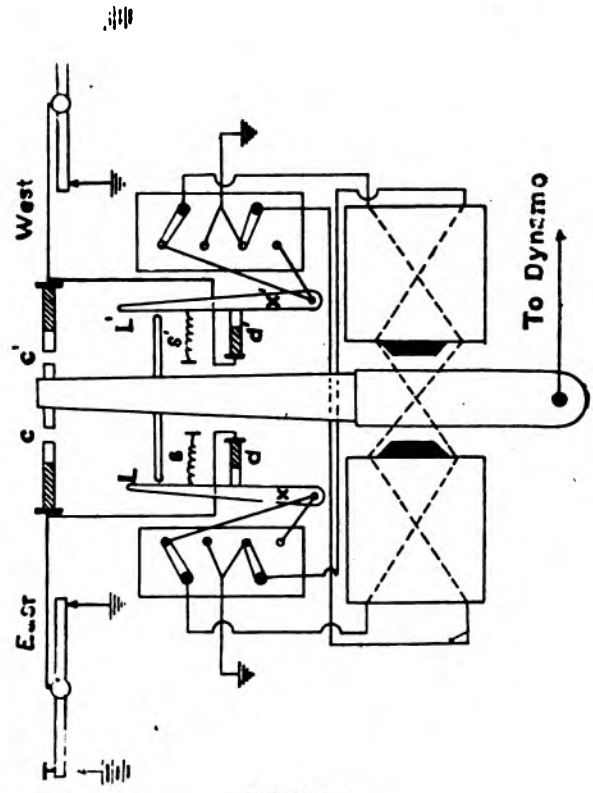

FIGURE I.

Mr. Catlin's arrangement is about to be given another trial in the near future.

It will be seen by a glance at the accompanying diagrams that it is what might be called an open circuit method, inasmuch as when the circuit is idle there is no current flowing in either wire, each distant terminal being grounded through the transmitter points when the key is open, which is its normal position when not in use.

The repeating relay is simply an ordinary polarized duplex relay with the usual double set of coils, each of which latter are in series with one

of the two line wires, thus avoiding the necessity of providing two instruments.

To one end of the detached lever of the polarized relay the main line battery for the operation of the two line circuits is connected, as shown in the illustrations. When the lever is attracted to either contact point current flows from the dynamo through the wire on that side to the ground via the open key at the distant station.

In order to simplify the diagram, the operation may be more clearly understood by noting the connections in Figure 2, in which the three-point switches are omitted and a pivoted detached lever is placed between the polepieces of two separate electromagnets.

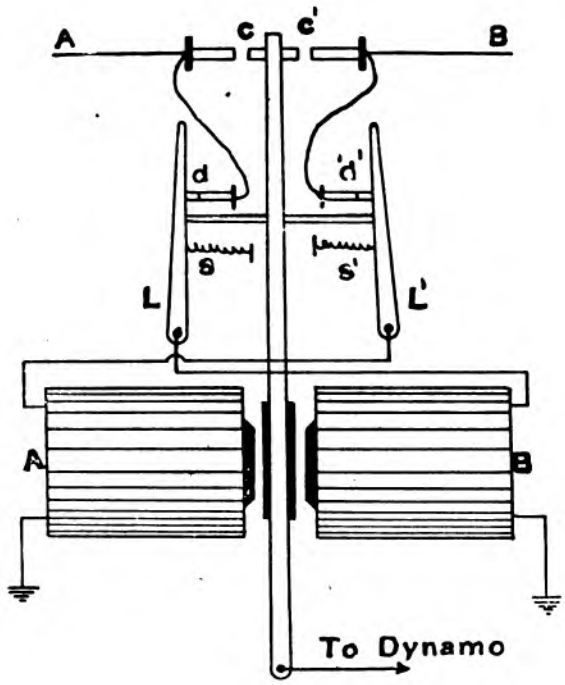

FIGURE 2.

The relay lever possesses an ivory crossarm which almost touches levers L and L' when it is in its normal position midway between the contact points c and c'. Levers L and L' are held against their own contact points by retractile springs in order to preserve the continuity of the line wires through the coils of the two relay magnets.

THE OPERATION.

When the operator at station A depresses his key he sends current through the line and relay coil B at the repeating station. Magnet B therefore attracts the large lever and closes contact point c', thereby permitting the dynamo to send current to station B.

In order that magnet A shall not catch any of the current the crossarm is so adjusted that it breaks the contact points of small lever L' just before the big lever touches c'. Opening the key at station A, of course, demagnetizes magnet B and opens contact point c' again. When station B breaks or wishes to send, the action is simply reversed.

Figure 1 represents the same repeater with switches added for the purpose of reversing the direction of the current through the polar relay when the polarity of the distant battery demands it.

The great efficiency of this repeater no doubt is due to the fact that the relay responds to direction of current only, instead of volume, and for the further reason that, like a quadruplex relay responding indifferently to either the long or the short-end current, it is not easily thrown out of order by changes in the volume of current which occur in the line during a temporary downpour of rain. The absence of local battery circuits and trunnions also eliminates a number of adjustable points present in other repeaters.

Mr. Catlin's method is obviously unavailable for circuits possessing intermediate stations, but by using a transmitter instead of a "key," as shown in these diagrams, brokers at terminal stations may control the transmitter by means of an extra key in the transmitter local circuit, while the relays would be looped in the main line in the usual manner. However, the details of connecting extra loops need cause no anxiety. If the coming test fulfils expectations a great step will have been made in the direction of permanently adjusted apparatus.

Recent Telegraph and Telephone Patents.

A patent, No. 925,573, for a telephone exchange system, has been granted to William A. Fricke, of Chicago, Ill. Describes the details of an interior telephone system.

A patent, No. 925,737, for a telegraph key, has been issued to L. Wilson, of Sidney, W. Va. A telegraph key with a secondary lever disposed over the key and arranged to automatically open and close the circuit upon gripping the key or releasing the key in the sending of the message.

A patent, No. 925,756, for telephony, has been awarded to George C. Cummings, of Western Springs, Ill. Describes a system of telephony.

A patent, No. 925,775, for an appliance for use with telephone transmitters, has been taken out by Edward F. Hutton, of New York, and George A. Ellis, Jr., of Bay Shore, N. Y. A telephone box or casing has means for detachably securing a portable telephone set therein, and a door secured thereto has a facial opening in it having substantially the contour of the lower portion of a person's face.

A patent, No. 925,806, for an appliance for use with telephone transmitters, has been secured by Orrin H. Goodrich, of Castleton Corners, N. Y. An inclosing casing or box for a portable telephone transmitter is provided with a circuit-changing lever, and a circuit-changing arm exterior to the box and attached to a shaft journaled in one side of the box is adapted to support the

receiver. Mechanical connections inside the box are adapted to actuate the circuit-changing lever.

A patent, No. 925,925, for a telegraph transmitter, has been granted to C. W. Leiser, of Salt Lake City, Utah. Separate keys are employed, one operating the line circuit direct for making dashes and the other operating the local circuit to produce dots.

A patent, No. 926,162, for a transmitting device for telegraph operators, has been issued to W. C. Achgill, of Oklahoma City, Okla. The body portion of a cabinet has its lower rear edge hinged and is provided with two finger keys, one to make the dot and the other the dashes.

A patent, No. 926,663, for a telegraph repeater, has been awarded to E. Longoria, of Monterey, Mexico. An automatic repeater which avoids the use of compensating rheostats or differential relays. A local circuit operates each repeater, which is opened and closed by the corresponding transmitter.

A patent, No. 926,199, for a toll apparatus for telephone exchanges, has been granted to Sherwood J. Larned, of Chicago, Ill.

A patent, No. 926,510, for a party-line telephone system, has been issued to Homer J. Roberts, of Evanston, and Cyril A. Soans and Albert H. Graves, of Chicago, Ill.

The following patents have expired:

Patents Nos. 477,383 and 477,384, for a printing telegraph, held by Charles J. Reed, of Orange, N. J.

Patent No. 477,652, for a writing-telegraph system, held by Harry Etheridge, of Pittsburg, Pa.

Patent No. 477,665, for individualizing cut-out printing telegraphs, held by Samuel R. Linville, of Philadelphia, Pa.

Personal.

Mr. Walter P. Phillips, of Bridgeport, Conn., was a recent New York visitor, calling on many friends while in the city.

Mr. G. M. Dodge, of Valparaiso, Ind., was a recent New York business visitor. He took occasion while in the city to call on many of his friends.

Mr. C. P. Edwards, of Montreal, has been appointed by the Canadian Civil Service Commissioners as superintendent of government wireless telegraph stations.

Mr. D. Robertson, the head of the New Zealand postal and telegraph department, on a recent visit in this country said that the Chicago post office is considered by foreign postal officials to be the best arranged and best managed government office of any city in the world.

Mr. A. B. Banker, formerly of the Postal Telegraph-Cable Company, New York, but who has been for the past ten years connected with Paul Smith's in the Adirondacks, was a recent New York visitor, coming here on business for the hotel interests, with which he is identified.

Mr. William A. Porteous, superintendent of the Postal Telegraph-Cable Company at New Orleans, La., until about two years ago, since which time he has been practicing law and been engaged in other business, was a New York visitor last week, coming to the Metropolis in the interests of his legal practice.

Mr. Thomas B. Doolittle, who lately retired from active service with the American Telephone and Telegraph Company at Boston, Mass., has had the honorary degree of Doctor of Science conferred upon him by Dartmouth College. Mr. Doolittle before entering the telephone service, thirty years ago, was a well known telegraph official.

Among recent New York visitors were: Mr. Charles E. Davies, chief operator of the Great North Western Telegraph Company, at Ottawa, Ont. Mr. Davies was in the city making arrangements for the manufacture of his telegraph repeater, which is meeting with so much success.

Major Edgar Russel, of the United States Signal Service, Fort Leavenworth, Kans., was a recent New York visitor while en route to New London, Conn., where he will be located for the summer. Major Russel is well known in telegraph circles and made many personal calls while in the city.

Mr. Thomas A. Edison, in a newspaper interview, recently announced the completion of the improved storage battery upon which he has been working for several years. The new battery, he believes, solves the problem of successful and economical operation of trucks and automobiles by electric power by reason of its occupying less space and having a longer life than those batteries which are in service at the present time.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Edward J. Nally, vice-president and general manager of the company, is again at his desk after a six weeks' trip of inspection of the company's plant, which necessitated his going as far as the Pacific Coast.

Mr. Nally states that every place he visited showed unmistakable signs of prosperity, that San Francisco had performed wonders in the marvelously short time in which it has so substantially rebuilt itself, and that the city is more beautiful than ever; that San Diego and Los Angeles and the Northern Pacific cities still continue in their wonderful growth and development, and that from the telegraph standpoint he found everything highly encouraging.

Mr. Charles P. Bruch, third vice-president of the company, is absent from his office enjoying a vacation.

Mr. C. F. Leonard, superintendent, with headquarters at New York, is absent on vacation. Mr.

L. Lemon, division superintendent, is attending to the duties of Mr. Leonard's position during his absence.

Mr. W. J. Maguire, of Boston, has charge of the company's interests at Beverly, Mass., during the stay of President Taft at that place.

Among the attaches of the executive offices on or returned from vacations are Joseph D. Ravenolia, of Vice-President Charles C. Adams' office; H. R. Monahan, J. P. O'Donohue and H. H. Sherman, of the electrical engineer's department.

The company moved into its new offices at Salt Lake City on July 4. This office, as previously described in this column, has a modern equipment, and those in charge of the company's affairs at Salt Lake City are justly proud of their new quarters.

Mr. J. J. Barnett has been appointed manager of the Knoxville, Tenn., office vice Mr. W. R. Hurst, who has been transferred to the managership of the Mobile, Ala., office. Mr. Barnett is one of the young men in the telegraph service, having been born January 17, 1880, at Montgomery. Ala., where he entered the employ of the company in 1890, as the first messenger at that point. He has since that time served as clerk and operator at Montgomery until 1906, when he was appointed manager of the Anniston, Ala., office of the company, which position he held up to the time of his present advancement.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Colonel Robert C. Clowry, president and general manager of the company, will reside during the heated term at Spring Lake, N. J. He will, however, be in the city each day to attend to the duties of his office.

Mr. George J. Gould, vice-president of the company, sailed for Europe a few days since, to be absent about two months on business and pleasure.

Among the recent visitors to the Barclay printing department were directors Jacob H. Schiff and John T. Terry of the company. They congratulated Mr. John C. Barclay, the inventor, on the successful working of his printing system, which is rendering such satisfactory service to all concerned.

Mr. James J. Morris, manager of the Chamber of Commerce office of the company at Milwaukee, sailed from New York for Europe on July 10 to be absent about three months. Mr. Morris has spent several of his vacations abroad.

Mr. John F. Haas has charge of the company's interests at Beverly, Mass., during the stay of President Taft at that point.

The new cable steamer that has been in course of construction for this company for some time past will be launched within the next two or three weeks. The boat will have double engines and a modern cable equipment. The new steamer measures one hundred and fifty feet in length, with a thirty-two-foot beam. She will be commanded by Captain Olmstead, with Alexander Klein in charge of the electrical department. These gentlemen have had twenty-five years' experience in cable laying and repairing on the cable tug "Western Union," which boat will be abandoned for cable purposes after the new craft is completed.

Mr. A. C. Gibbs, for many years assistant in the bookkeeping department, has been promoted to the position of chief of that department, vice Robert W. Chapman, retired on a pension after a continuous service of over forty years.

Among recent executive office visitors were: E. A. Baird, manager of the Binghamton, N. Y., office; J. B. Wooster, manager of the Auburn, N. Y., office, and J. E. Jenkins, inspector at New Haven.

Nelson E. Church, Superintendent at Pittsburg.

Mr. Nelson E. Church, whose appointment as superintendent at Pittsburg was announced in our June 1 issue, is another one of that great

NELSON E. CHURCH.
Superintendent, Western Union Telegraph Company, Pittsburg, Pa.

number of successful members of the telegraphic fraternity who claim Ohio as their birthplace, being born at Newark, that State, April 8, 1861. He first entered the telegraph service at his native place in 1879, being employed by the American Union and Baltimore and Ohio telegraph companies. When the former company consolidated with the Western Union, in 1881, Mr. Church became manager of that company's office in Newark, resigning this position in 1882 to enter the service of the Baltimore and Ohio Railroad. In 1884 he left this employ and became chief clerk at Chicago to Robert Stewart, general superintendent of the Bankers and Merchants Telegraph Company. Upon the failure of that company, in 1884, Mr. Church went to Cincinnati and accepted a position as chief clerk to B. F. Lloyd, superintendent of the Baltimore

and Ohio Telegraph Company. After the absorption of the Baltimore and Ohio Company by the Western Union Telegraph Company, Mr. Church entered the employ of the latter company in New York. On January 1, 1891, he was sent by Mr. Charles A. Tinker, general superintendent of the company, to Pittsburg as cashier and transfer agent at that point. He was later made manager of the Pittsburg office, which position he held until the time of his present promotion, with the exception of a few months when he was obliged to retire from active service on account of ill health.

William J. Lloyd Promoted to a Superintendency.

Mr. W. J. Lloyd, the recently appointed superintendent of the first district of the Western division of the Western Union Telegraph Company, with headquarters at Chicago, started in the telegraph service with the old Illinois and Mississippi Telegraph Company at Dubuque, Ia., and has worked through all the grades from messenger up to his present position.

WILLIAM J. LLOYD.
Superintendent of Western Union Telegraph Company at Chicago.

The first district is in point of poles, wireage and number of offices probably the largest in the service of the Western Union Company.

The Cable.

Alfred C. M. Weaver, aged forty-eight years, assistant manager of the Eastern Extension Telegraph Company's cable station at Singapore, died on June 7 from the effects of an operation for appendicitis. Mr. Weaver was well known in cable circles throughout the world.

Cable communication is interrupted July 14 with:

Demerara June 19, 1909

The Commercial Cable Company has been officially advised by the British government that inspectors will be appointed to examine the trawling apparatus used by steam fishing trawlers which have recently been interrupting submarine cables off the coast of Ireland, and it is confidently expected that the proposed thorough supervision of the trawling apparatus will have a very satisfactory result.

Mr. James R. Beard, secretary of the Mexican and of the Central and South American Telegraph Companies, New York, will sail for Europe during the last week of July, to be absent about six weeks. Mr. Beard's trip abroad is one of pleasure, his health of late not having been of the best.

The Telegraph Construction and Maintenance Company's cable steamer "Colonia" left the Thames July 1 and proceeded to Newfoundland for the purpose of laying about 300 miles of cable eastward and 1,400 miles westward, for the Commercial Cable Company, for a new line of communication between St. John's (Newfoundland) and New York.

The "Colonia" arrived at St. John's on July 10 and reported bad weather, fogs and icebergs. She commenced laying the shore ends of the St. John's-Waterville and the St. John's-New York cables July 12. After laying the shore ends of these cables she will pay out between two and three hundred miles of cable from St. John's eastward towards the Flemish Cap, where the existing cable will be cut and the new cable just laid will be joined on.

The "Colonia" will then return to St. John's and proceed to the laying of the New York-St. John's cable. The vessel is scheduled to reach New York about July 26.

British Pacific Cable.

In his address to the Imperial Press Conference, Lord Crewe made reference to the debit balance on the working of the Pacific cable, pointing out at the same time that even if this expenditure were constant, it was quite justified by the fact that the laying of this state-owned cable had brought about very considerable reductions in the rates which had been maintained on the so-called "pioneer lines" previous to the laying of this cable across the Pacific. The following figures, abstracted from the official accounts of the Pacific Cable Board, show in detail the amount which each of the governments who are partners in this work have to disburse. It will be seen that, generally speaking, this amount is a diminishing quantity. The accounts for the current year are not yet published.

Deficiency recoverable in the following proportions:

	1908.
United Kingdom	5/18ths = £8,580
Canada	5/18ths = £8,580
New Zealand	2/18ths = £3,432
Queensland, New South Wales and Victoria each	2/18ths = £3,432

Year ending March.	Gross earning.	Terminable annuity (50 years).	Working expenses.	Deficiency.	Add—Reserve fund, inc. int. on same.	Bringing apparent deficiency to
Printed.	£	£	£	£	£	£
Aug., 1903...	19,579*	.....	40,526	.....	16,500†	.....
July, 1904...	79,824	77,544	54,824	52,544	35,794	88,338
" 1905...	87,306	77,544	50,751	40,989	35,140	76,129
" 1906...	91,814	77,544	52,964	38,694	34,138	72,832
" 1907...	113,000	77,544	57,895	22,439	33,516	55,955
" 1908...	109,637	77,544	62,978	30,885	32,523	63,408

*Cable opened for traffic December 8, 1902, about three months' return only.
†Including purchase of Stock Cable = £11,209.

Thus we see that, taking this "deficiency" figure, which includes working expenses, and the fifty years' terminable annuity, amounting to £77,544 per annum, but which excludes an additional reserve fund, with interest thereon, amounting so far to about £33,000 per annum, we find that for last year Great Britain's proportion of guarantee cost her the sum of £8,580 on the Pacific cable account. It is worth noting that while on telegrams reaching Great Britain from Australia the Post Office here charges no "terminal tax" whatever, but only the equivalent of the ordinary inland rate of one halfpenny per word, the amount charged by the Commonwealth as "terminal tax" is fivepence on every word reaching Australia from Great Britain, while the inland rate for telegrams throughout Australia is only one penny per word.—Electrical Review, London.

Municipal Electricians.

The fourteenth annual convention of the International Association of Municipal Electricians, which will take place at Young's Hotel, Atlantic City, N. J., September 14, 15 and 16, promises to be one of the most successful ever held by the association. Any information concerning the association or the coming meeting will be cheerfully supplied by the secretary, Mr. Frank P. Foster, of Corning, N. Y.

The many friends of Mr. Michael R. Brennan will be pleased to learn of his reinstatement as superintendent of police telegraphs of the city of New York. Mr. Brennan's restoration includes back pay for all of the time during which he has been out of the office, about two years. He is a telegraph expert of exceptional ability, and his attempted removal from office as a political expedient never met the approval of those having at heart the best interests of the city.

A patent, No. 925,575, for an automatic fire alarm, has been granted to Hermann Furlani, of Pirano, Austria-Hungary. Comprises a conductive tube with insulated electric terminals projecting into each end of it, and movable conductive material normally maintained out of contact with these terminals by separated fusible masses disposed at opposite ends of the tube and fusible at different temperatures, and an invertible back plate upon which the tube is mounted.

Radio-Telegraphy.

A French company is planning to establish a wireless station at Tahiti.

It is reported that the Pacific Islands Radio-Telegraphy Company, which was recently established in London, will soon begin the erection of wireless stations on the Pacific.

Samuel Coles, wireless telegraph operator upon the wrecked Cunard liner Slavonia, has accepted a position as operator on Mr. George J. Gould's private yacht, the Atalanta, which has recently been equipped with a wireless outfit.

Mr. G. Marconi has announced that he expects to be able by August to supply a press service for 15,000 words a day, at least, across the Atlantic at five cents per word. Mr. Marconi has also said that he believes it possible in the near future to communicate by wireless over a distance of 6,000 miles or even more. He adds that the present speed of wireless messages across the Atlantic is thirty-five words a minute, but it is hoped soon to increase this to fifty words.

A patent, No. 925,291, for a receiver for wireless signaling, has been issued to Hugh C. Cayley, of Riverside, Cal. A wave detector has an imperfect contact comprising two members, one of which is movable relatively to the other, an armature lever (controlled by a magnet) connected with the movable member, a battery circuit connected with the imperfect contact and with the magnet, and a shunt circuit connected with the battery circuit and including a condenser and telephonic receiver.

A patent, No. 924,827, for an oscillation-receiver, has been taken out by Greenleaf W. Pickard, of Amesbury, Mass. Comprises two electrical conductors which respectively possess rectifying properties, the action of one conductor being to oppose oscillation passing from it toward the other, and the action of the other conductor being to oppose oscillations passing to it from the other.

In a recent newspaper interview Nikola Tesla stated that he expected that it would soon be possible for a business man in New York to dictate instructions and have them instantly appear in type in London and elsewhere. He also expects to be able to call up from his desk and talk with any telephone subscriber in the world, the only means to this end necessary being an inexpensive instrument no larger than a watch. Similarly we will be able to transfer any picture, drawing or print from one place to another by wireless. As to the transmission of power without wires, he said that he has been experimenting with a motor boat operated by wireless power, and the results convince him that ocean liners may in future cross the Atlantic Ocean at high speed by power sent from a wireless station on shore.

The Main Underground Telegraph System of Great Britain.*

BY MAJOR W. A. J. O'MEARA, OF LONDON.

Engineer-in-Chief of the British Postal Telegraphs.

(Continued from page 460, July 1 issue.)

The operations in connection with the laying of pipes and drawing in of cables already described have occasioned very little trouble and anxiety, but in connection with the jointing of the cables considerable difficulty has arisen, as it has not been possible to find men in the open market with sufficient skill and knowledge who could be entrusted with the very important work of joining together the cable lengths. This difficulty was finally overcome by the department taking in hand the necessary measures to train the men for the work of jointing the conductors and of making the plumber's joints on the lead sheaths.

The number of men employed in a jointing gang has varied to a small extent. A foreman is always placed in charge of the gang, and it has been found convenient to employ two plumbers, four jointers, and four jointers' mates in each gang. In addition to the skilled men mentioned, a certain number of laborers are necessary in order to open the holes, work the desiccator and act as night watchmen.

The number of joints made in a day and the time taken to make a single joint has naturally depended on the number of conductors in the cables to be jointed. The rate of progress in two actual cases, in which the numbers of conductors in the cables were ninety-six and one hundred and ten, has been four completed joints per day, executed by gangs constituted as before mentioned.

*Paper read at the first International Conference of Telegraph and Telephone Engineers, Budapest, 1908.

For jointing, a hole one and eight-tenths meters long by one meter broad and one meter deep is dug, and a narrow trench is made over the end of the pipe line for the purpose of placing a cast-iron

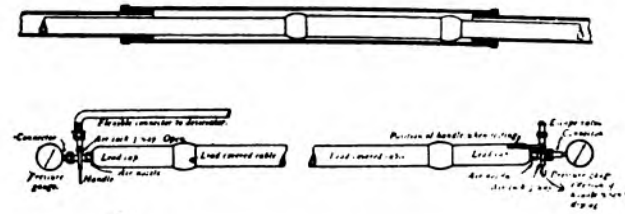

FIGURE 6

solid slide in position ready for drawing over the completed cable joint. The general arrangement is shown in the upper part of Figure 6. The sides and bottoms of the hole are protected by iron sheets, and every precaution is taken to protect the exposed cable end from moisture. Two jointers' tents fitted end to end are placed over the hole, and in rainy weather a tarpaulin is placed over the tents to make them waterproof.

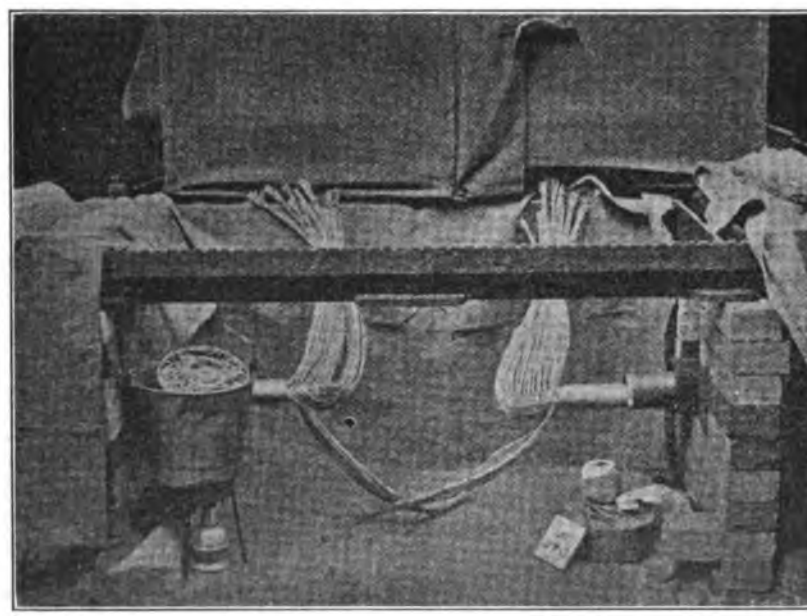

FIGURE 7

As the joint holes are occasionally situated in permeable soil in the neighborhood of springs, or under conditions which render it necessary continually to remove the water entering them, and are liable to be flooded suddenly during rain storms, it has been found advisable always to have a lift pump with flexible hose at hand.

The leading jointer first proves the wires for crosses, contacts, and continuity, and, if everything is satisfactory, the length of cable over and above that necessary for the overlap is sawn off.

The lead sheathing is next removed, after passing the lead sleeve over the end on the terminating pipe side of the jointing box. Where terminating pipes are provided at double junction boxes, and it is necessary to use an air cap lead sleeve, suitable sleeves are used, having an air cap towards one end

to permit of the sleeve being inserted well into the pipe, and to expose a gap of sufficient length for the joint. The cable is then halved out, that is to say, the layers or wires are separated from each other, being secured by string ties near the lead sheath, and each layer afterwards halved into an upper and lower portion, as shown in Figure 7. This process of stripping and halving usually occupies one and a half to two hours.

All is now in readiness for making the first conductor joint. The practice is to commence with a wire in the center of the bottom half of the outer layer of wires and work from the bottom of the cable upwards, and not from the center of the cable outwards. The latter course is sometimes adopted by a novice, but it leads to waste of time, because it involves the jointing of wires in awkward positions under completed joints.

A competent jointer dealing with a composite cable will handle his wires in the following manner: If he commences with a four-wire core, he first untwists the paper wrapping and removes the thread common to each pair. Roughly cutting off the surplus length of conductor, he slips on a paper sleeve, unwinds the single wire thread to a point near the sleeve, ties and snaps off the spare length of thread, and turns up the paper insulation. The end of the conductor is now sandpapered and cut to the exact length. Dealing with the other side, the jointer untwists the core wrapping and removes the pair cottons, and, as before, the single wire thread is unwound, tied and snapped off. An expert workman will tie and snap off the threads with great celerity without weakening the knot or wasting time in handling the cutters, and, generally speaking, it is in the avoidance of unnecessary handling of tools that the skill of the jointer is revealed. If he has to cut the conductors to exact lengths, he will cut several while the cutters are in his hand, and when he is using the soldering iron his work is so arranged that several joints will be soldered before his attention is turned to anything else. This principle extended to a multitude of similar operations results in a considerable saving of time.

The wire is next cut to a length which leaves a small space between the two opposing ends, and is sandpapered. A copper jointing tube is slipped for half its length over each of the ends and pinched with the side cutters to hold it in position. The tube and wires are now soldered together with the lineman's solder, with resin as a flux. The paper is now turned down from each side upon the conductor and the sleeve drawn forward. The four joints in each core are made side by side, and the core wrappings from right and left are brought to an overlap at the paper sleeves, and tied so that the four wires may at once be identified as a complete core.

Turning his attention now to a screened wire, the jointer takes first what will be termed the short end, puts a tie round the metal screen, and tears the latter off neatly at the tie. There are three separate spirals of paper between the screening and the longitudinal paper covering which lies next to the conductor, and of these one is removed at the tie and the other two are bent back, while the paper next to the conductor is also torn off at the tie. Turning then to the other side of the joint to deal with the long end, the screen is tied and torn off as before, two spirals of the paper are turned back, and the third removed. The paper sleeve is drawn over the wrapping lying next to the conductor. The end of the conductor is sandpapered, cut to length, and the copper tube put on and pinched. The short side is also fitted in the tube and pinched, and the joint is soldered as previously described. The spirals of paper from the short side are rewrapped for about 1.25 centimeters, and the sleeve from the long end brought forward to a position where it overlaps the longitudinal wrapping on the long side and the rewrapped spiral on the short. The spirals on the long side are then rewound as far as the paper sleeve, where one is torn off short and the other continued over the sleeve to the far end, where it is secured by a tie.

A capable man will joint his wires in such a way that he works always as it were on a bulging surface. If the conductor joints are completed in a way that tends to form a sort of well or hollow, the free handling of wires requiring to be jointed in the hollow is greatly hindered.

The two most prominent difficulties which impede a jointer are awkward positions as regards the joints and the presence of water. Better joints and more speedy work can be expected when a man can sit square with the cable and have the joint well under his hands. The presence of other cables and pipes sometimes prevents access from above, and the cable must be jointed from below, the jointer lying underneath the cable.

Both the multiple-twin and quadruple-pair cables present some initial difficulty in jointing. Ordinary twin cables are jointed straight through, pair to pair. With the multiple-twin cable care has to be taken to joint different-colored pairs together in each core, as each of the different-colored pairs is laid up with a distinctive lay or twist. Thus, in a core of eight wires, the

White pair is joined to the green pair
Red " " " blue "
Green " " " red "
Blue " " " white "

This method equalizes the length of "lay" over a long section. Similar precautions have to be taken with the quadruple-pair cable. The pairs forming a quadruple core are laid up with different colors, and each core has a different color. In jointing it is necessary that dissimilar color in each core be jointed together, and that the position of pairs diagonally opposite to each other in the cores be unaltered. By this means the pairs which are laid up with unequal "lay" are made equal in length, and therefore equal in resistance over a long section. If these precautions were not taken, two bunched pairs would be of unequal resistance over a long section, the electrical balance would be upset, and successful working and superimposing would be impracticable.

After completing the conductor joints, the lead sleeve is pulled again over the gap, and after being dressed down upon the cable sheath, is closely wrapped at each end with prepared canvas and india-rubber strip successively.

A joint is thus made temporarily watertight and reasonably secure until such time as a plumber is available, but the interval between conductor jointing and plumbing should be reduced to a minimum. When this officer is ready, the joint is carefully dried by means of a charcoal brazier and before wrapping the whole joint with paper a small piece of silvered glass is held over the conductors in order to detect any moisture. Should there be any appearance of vapor on the glass the drying by means of a brazier is continued. When the drying has proved satisfactory, the plumber takes possession and proceeds to fix the lead sleeve.

Needless to say, an awkward position affects a plumber adversely as well as a jointer, and in some circumstances considerable experience is needed to effect a thoroughly sound wiped joint. The time occupied in the various duties incident to plumbing is as follows: Cleaning out the hole, half an hour; preparing the sheathing and lead sleeve, three-quarters of an hour; wiping two joints on the one lead sleeve, one hour. Caulking down the manhole lid usually occupies another half hour.

When the underground cable was laid between London and Birmingham, no very reliable means were at hand to test the efficiency of the plumbers' joints on the lead sheathing, but since the completion of this section of the main underground scheme the desiccator pump has been introduced into the Telegraph Engineering Department, and every plumber's joint is tested with air pressure by its means.

After five or six cable lengths have been joined up, the exposed ends of the cable are fitted with lead caps having air nozzles. A pressure gauge is connected to one of the nozzles and a pressure gauge and desiccator to the other, as shown in the lower part of Figure 6. The compressor is then started, and when the pressure gauges at the extremities of the cable indicate twenty pounds pressure the plumbers' work is tested by smearing soapsuds over the wiped joints. If any flaw is discovered the joint is entirely remade.

After the pump has been stopped and while the pressure is still in the cable, observation is kept on the pressure gauges, so that any fall due to an imperfection in the sheath of the cable may not escape notice.

An air-pressure test of each complete five-mile section is also made. The ends of the cable are fitted as shown in the lower part of Figure 6, and pressure maintained until the gauge at the distant end indicates twenty pounds. The three-way cock is then closed to prevent the air leaking back through the desiccator and the pressure allowed to equalize throughout the cable. A note is made of the time when the gauges read alike and another reading taken twenty-four hours later. During this period the fall of pressure must not exceed five per cent.

Although, as I have explained, the cable lengths have been tested before being despatched from the factories, some trouble has been experienced during the progress of the work in dealing with manufacturers' faults after cables have been drawn into the pipes, and a great deal of inconvenience was caused by the discovery of faults arising from the existence of metallic fillings in the insulating paper used in the cables delivered between Exeter and Taunton in the early part of this year, with the result that seventy faulty cable lengths had to be returned to the manufacturers. As this period of the year unfortunately coincided with the termination of the Parliamentary financial year, it was quite impossible to replace these lengths in the short time available before March 31, and in consequence a considerable amount of the money voted for this work was unexpended on the date mentioned and had to be surrendered. In order to prevent the possibility of faults of this nature remaining undetected when the cables are tested at the factories, it has been decided to test the cables at a pressure of 1,000 volts instead of 600 volts, as was the practice until the beginning of this year.

It has usually been possible in these cases to localize the earth faults by means of the loop test to within two-tenths of a meter of the point at which they have occurred.

I may say that our experience up to the present time with the lead-sheathed cables provided on our main routes has been very satisfactory. The cables have not certainly been entirely free from interruption since they have been brought into use; a few faults have developed which may be traceable to faulty workmanship; in a few cases cables have been accidentally damaged by workmen employed by the road authorities, and in two cases, where the route passes over coal workings, the roadway has subsided, though in only one of these cases did interruption to the circuits result. The first of the subsidences referred to above occurred in 1907 south of Hamilton, in Scotland, where from thirty-six to forty-five meters of the roadway sank some three meters below its original level; the pipes were drawn, but the cable remained intact, although it has no doubt been somewhat stretched. In the case of the second subsidence, which occurred north of Hamilton in March, 1908, the lead sheath of the cable was ruptured, causing a complete interruption to the traffic.

An eminently satisfactory feature in the situation arises from the fact that in the original section of the cable between London and Birmingham, in which 125,476 conductors' joints and 1,651 plumbers' wiped joints are involved, only three interruptions have occurred since June, 1900, when the cable was first brought into use, and the cost of removing the faults has only amounted to 2,350 francs.

It will have been observed that the first of the three types of cables used on the northern route possesses no screened conductors, this type not then having been introduced. With high-voltage Wheatstone circuits it has not been found possible to secure

successful working simultaneously on the neighboring unscreened conductors for a distance exceeding twenty kilometers. It would thus be necessary to work Wheatstone on loops through the first section of cable, and then insert a repeater, the signals being repeated to a single aerial conductor earthed at both ends, as shown in Figure 8.

The majority of the circuits in use are, however, wholly in the underground cable, and in such cases loop-working is adopted throughout (the repeater not being required), while an additional circuit, key-worked, is superimposed on the loop, as shown in Figure 9.

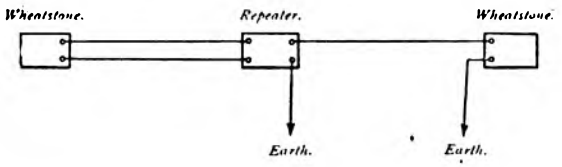

FIGURE 8

Between London and the various large cities on the route of the cables described there are working, on loops, thirty-eight circuits, made up as follows:

12 Wheatstone Duplex,
10 Hughes Duplex,
3 Wheatstone Simplex (for news work),
9 Double-Current Sounder Duplex,
4 Quadruplex (one with Wheatstone),

and upon twenty-six of these loops additional double-current duplex circuits are superimposed. This gives a total number of working channels of 133, and additional superimposing is possible up to the total number of loops available, viz., thirty-eight.

Figure 9 gives a diagrammatic representation of the apparatus connections necessary for superimposing a key-worked duplex circuit upon a cable loop, which may be a duplex-worked Hughes or Wheatstone, or a quadruplex.

The two conductors of the loop and the loop apparatus are shunted at each end of the circuit by a high non-inductive resistance, from the center of which is taken the line connection of the superimposed or "plus" circuit. Thus the conductor of the superimposed circuit consists of the two wires of the loop in parallel, with the addition of resistance at each end. In the case of lines under 240 kilometers in length each of the superimposing coils or arms has a resistance of 3,000 ohms, and on lines over 240 kilometers in length 5,000-ohm coils are used. Each arm of the superimposing coils is shunted by a condenser, which acts as a signaling condenser for the plus circuits, increasing considerably the range of working of the circuits. The capacity of these condensers is ten microfarads for circuits over 240 kilometers in length, while for lines of less than 160 kilometers no signaling condenser is required.

From an examination of the theoretical diagram of the circuits shown in Figure 9 it will perhaps be noticed that the battery of the superimposed circuit ensures on the two conductors equality of potential in its adjacent points so long as the conductors are throughout equal in resistance and capacity.

Similarly the points of connection of the superimposed circuit with reference to the loop battery are of equal potential, being in the exact center of the two electrically parallel circuits traversed by the loop currents.

Owing to the non-effective circulation of the current in the superimposing arms, the arrangement entails some waste of current from the loop batteries at each end of the circuit. This is, however, a small matter compared with the advantage obtained by the increased number of channels.

In the Western Cable the following circuits are working from London, in some cases for the whole distance, and in others for the greater part of their lengths:

Wheatstone duplex	4
Quadruplex	10
Double-current duplex	25
Double-current simplex	8

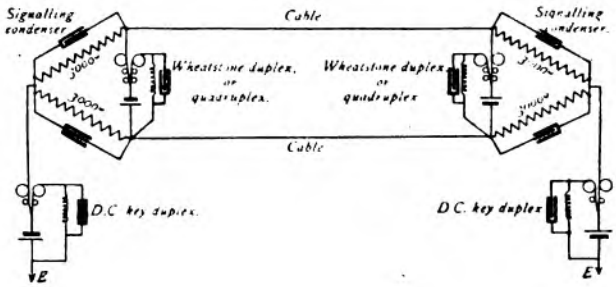

FIGURE 9

It should be understood that in addition to these mentioned many long-distance circuits are working for a part of their length through the cable, and are brought out at various points and continued therefrom by means of aerial conductors. The question as to the final allocation of circuits in the cable is still under consideration, and many changes are in course of progress.

One of the first experimental uses made of the Western Cable was to make up a direct circuit, London to Cork, Ireland, worked by means of the undulator, the repeater formerly in use for ordinary working being in the meantime cut out of circuit.

The circuit comprised on the English side 192 kilometers of underground cable and 269 kilometers of aerial wire; 120.64 kilometers of submarine cable, and on the Irish side 192 kilometers of aerial cable. With simplex conditions, a speed of 130 words per minute was obtained. At duplex, however, disturbing effects from neighboring wires in the submarine cable led to a reduction in the speed of working to eighty-six words per minute.

The extreme sensibility of the undulator renders it very valuable on long circuits subject to a sudden fall in insulation. This is shown by the fact that duplex working between London and Cork, a distance of 893 kilometers (with long lengths of underground and submarine cable), is practicable without a repeater, even when simplex working only is possible on ordinary Morse circuits with the aid of a repeater.

The annual maintenance cost incurred in connection with the upkeep of these cables, which includes attention to joint boxes, test pillars, and the removal of the faults referred to, averaged for the twelve months ending March 31, 1908, one-half franc per kilometer of conductor, which compares favorably with the average annual cost of the similar service in respect to open wires, which amounted for the same period to four and one-tenth francs per kilometer.

When a large number of wires are involved, as in the case with the main routes described in this paper, the capital cost of underground construction per kilometer of conductor is approximately the same as that of overhead construction, and when the greater freedom from interruption of the underground conductors, as compared with that of open wires, and also the probable longer life of the underground plant is considered, clearly there is much to encourage the rapid extension of the main underground network of telegraph wires.

Much of the work originally proposed has been carried out, and there seems a likelihood that at an early date we shall have immunity from storm interruptions so far as our main telegraph lines are concerned.

(Concluded)

The Late Charles L. Buckingham.

A recent number of the Electrical World contains glowing tributes to the late Charles L. Buckingham, whose active life was spent in dealing with telegraph and electrical patent litigation, written by several of those who had been associated with him and knew him at his full worth. Their eulogies in part are as follows:

"Mr. Buckingham came into the field of electrical patent litigation at a time when very few lawyers possessed any knowledge of the theory and practice of electrical generation, distribution or utilization. Very early in his work in that field he demonstrated his capacity to grasp readily the most complex conditions of operation and the mathematical expressions of those conditions and, thus fortified, to conduct without electrical expert assistance the cross-examination of specialists in abstruse cases. His record is so notable that the story of his labors in that field may be said to be closely interwoven with the history of successful patent litigation, and the results of those labors have shaped to a material extent the commercial development of the telegraphic, electric light and electric power branches of the modern art.

"His first important work for the Western Union Telegraph Company was with E. M. Dickerson in the famous case of the Gold and Stock Telegraph Company vs. Commercial Telegram Company et al., for infringement by the latter's stock tickers, of reissue patent No. 3,810 to Edward A. Calahan, dated January 25, 1870, in which suit application for preliminary injunction was argued before Judge Wallace, June 13, 1884, and a permanent injunction granted by Judge Shipman, April 1, 1885, restraining the Commercial company from further use of its tickers. This early triumph was the more notable because of the array of opposing counsel, including Roscoe Conkling, David Dudley Field and Samuel A. Duncan.

"Mr. Buckingham's experience in the exhaustive analysis of telegraph patents and apparatus doubtless led to his own conception of the printing telegraph system which he invented and developed during the time of his connection with Western Union affairs, and with which his name is so intimately associated that his patent and original labors in this direction need be referred to only briefly. His United States patents on this system and apparatus are about twenty-five in number, issued at various times from December 13, 1892, to February 25, 1908. His corresponding foreign patents remained in his hands at the time of his death.

"It is difficult for one who enjoyed the confidence of the late Charles L. Buckingham to speak or write with moderation concerning his amiable qualities as a friend and his admirable character as a man. He was a strong, forceful personality; generous in the old sense of the term, and unfailing in every obligation of friendship, often going far beyond the conventional requirements of such a relation and interpreting by his own large nature his duties toward one in whom he took a personal interest. He never received a favor which he did not endeavor to requite in multiple; and somewhere within him must have lain the feeling that a kindness shown to him was something which was beyond his power of repayment.

"The bigness of the man was evident in his powerful frame, his hearty voice, his straightforward manner, and all his methods of dealing with his associates or opponents. There was never any doubt as to what his opinions were, and no one engaged in controversy with him could ever have suspected underhand modes of treatment, however he might dread the strength of the opposition which he was certain to encounter.

"Besides being a good friend, Mr. Buckingham was an equally good enemy. He had a strong lust for battle, but it was fair fighting and no favor. If he made a hostile move, it was only after an open declaration of hostility and according to all the rules of civilized warfare. He was too self-reliant for petty envy, but he did not spare an opponent through false sentiment. His rule was to play the game. He was ambitious to win and he used all the legitimate methods at his command to secure that end.

"In the opinion of those who were most familiar with his work as a patent lawyer, he was one of the leading members of the patent bar, and as counsel for the defense in patent litigation, a position for which he was especially suited by nature and training it is doubtful if he has ever had a superior among American lawyers."

Telegraph Age.

Entered as second-class matter at the New York, N. Y., Post Office.

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.
H. E. DUNHAM, Associate Editor.

W. N. GATES, Special Adv. Agent, Garfield Bldg., Cleveland, O.

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

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JULY 16, 1909.

The Filing Time Law in Maryland.

The Court of Appeals of Maryland in an opinion handed down by Chief Justice Boyd, upholds the constitutionality of the act passed a year ago by the Legislature of that State requiring telegraph companies to place the time of sending and receiving upon every telegram sent from and to a point within the State.

The case was brought up for review before the State's highest court in an appeal by the Postal Telegraph-Cable Company against the State. The Postal Company allowed itself to be convicted by the Criminal Court of Baltimore. The case was appealed to test the constitutionality of the law.

Commenting upon the provisions of the law relating to the placing of "time filed" and "time received" on all messages the court says:

"A telegram showing quick despatch is a good advertisement for a company. It is well known that the long-distance telephone is frequently resorted to because of delays in transmitting and delivering telegraph messages, and as telephone companies are in competition with telegraph companies it is not easy to see why the latter would object to such records as these if they will make their service more prompt and efficient, unless it be that they are not willing to give their patrons information which will disclose negligence on their part, if there be any. If such be the object, then unquestionably the public interest is involved in such a requirement as this statute makes. Much of the recent legislation by Congress affecting railroad companies has added materially to the expense of conducting their business without additional profit to the companies, but in so far as it is reasonable and proper for the protection of the public against discrimination or other injustice, or even for the public convenience, it has often been sustained."

As far as we have been able to ascertain, the telegraph companies have never objected to sending the filing time or any other information, providing the same was paid for. The present tariff scale, however, is so adjusted that on each message which the companies handle they receive a profit of only a fraction of a cent, and if they are required to transmit the filing time free of charge, thus adding in some cases as much as fifty per cent. to the length it is preposterous to assume that they will still be able to carry on the business at a profit. The logical result then of this legislation will be a re-adjustment of the tariff to meet the increased cost of handling despatches, and those who benefit by the additional information will, of course, have to bear the expense. For each person, however, who suspects the companies of negligence in their duties and wishes to hold them to a strict account, there are many who have confidence enough in them to believe that they use all possible diligence in getting despatches through without delay. In fact, the test case upon which the court has just passed was carried through by the telegraph company at the suggestion of some of the leading merchants of Maryland, who were satisfied with the service they were getting. For those people whom we believe constitute a large majority of the users of the telegraph, the law works a hardship in compelling them to buy something for which they have no use.

Cut Cable Press Rates.

The committee appointed by the Imperial Press Conference, held at London, to deal with the question of cable rates, according to an English authority, reported on June 25 that the Pacific Cable Board had signified its willingness to reduce the charges on press messages by one-half. The board understood also that the government of New Zealand was prepared to make an equal reduction on the land rate, and there is reason to believe that Australia will follow suit.

Resolutions were adopted demanding that the Imperial Government increase the means and reduce the cost of cable communication with all parts of the empire, and urging upon the various governments of the empire the desirability of establishing a chain of wireless telegraph stations with the double purpose of cheapening communication and safeguarding the mercantile marine.

William Marconi, who was present, said that if considerable press work was forthcoming his company would give a press rate of two pence a word between Canada and England. It was possible to transmit twenty-five words a minute across the Atlantic, and he hoped soon to be able to send fifty. He said that soon it might be possible to communicate wirelessly for 6,000 miles instead of 3,000 as now.

The speakers, many of them prominent men, all

seem to have lost sight of the fact that large reductions in the charge for messages over long cables must of necessity mean many more cables, involving the expenditure of millions of money. This is a question which must not be looked at merely from the point of view of loss of revenue; those who have ventilated their views on the subject at the Press Conference seem to have regarded it as the only point to be considered. It must be remembered that rapidity and accuracy are the very essentials of the telegraph service, and that these essentials could only be secured by a fully sufficient number of cables to carry the traffic at all times. The necessity for many more cables would raise the important questions of interest on capital, depreciation and maintenance, working expenses and, finally, the provision and upkeep of the necessary cable repair steamers to insure that the cables should be in constant working order. A point, of which more than sufficient is made, is that of the "idle hours" of the cables. Owing to difference in time, this is a much shorter period than is generally supposed, and, of course, only applies to the hours during which the cables are not fully occupied. Until those who are discussing this matter at the Conference of Press Representatives fully comprehend the important bearing which the points mentioned have upon the general question of the reduction of cable rates, they will not be arguing from correct premises; and on a subject involving such heavy expenditure as would the provision of long submarine cables to meet the demand arising from any further large reduction in the present charges for cabling, it cannot be claimed that a fair start has been made in approaching so vast a subject.

Old Time and Military Telegraphers.

The committees having charge of the arrangements for the thirty-eighth annual reunion of the Old Time Telegraphers' and Historical Association, and the Society of the United States Military Telegraph Corps, which takes place at the Fort Pitt Hotel, Pittsburg, August 17, 18 and 19, have their plans well under way and expect to make this one of the most enjoyable reunions ever held by these two organizations. The program includes visits to Carnegie Institute, the Heinz factories and other points of interest around Pittsburg, and a river trip on a special boat to the plant of the Pittsburg Steel Company at Monessen. G. A. Cellar, of Pittsburg, superintendent of telegraph of the Pennsylvania Lines West of Pittsburg, is president of the Old Timers, and Colonel William Bender Wilson, of Holmesburg, Philadelphia, Pa., is president of the Military Telegraphers. Any inquiries about the coming gathering may be addressed to F. J. Scherrer, 195 Broadway, New York, secretary of the Old Time Telegraphers' and Historical Association, or to David Homer Bates, 658 Broadway, New York, secretary of the United States Military Telegraph Corps.

Trolley Induction Litigation.

The Western Union Telegraph Company, the Postal Telegraph-Cable Company and the Lake Shore and Michigan Southern Railroad Company have appealed to the Supreme Court of Indiana their injunction suit against the Chicago, Lake Shore and South Bend Traction Company, which was dismissed by Judge Tuthill, of the Laporte, Ind., Superior Court, as announced in our columns June 16. This injunction case was instituted in December, 1908, and charged that the alternating current which is used to operate the cars of the Traction Company is so powerful and far-reaching in its effects, that by induction it seriously interferes with the working of the telegraph company's wires, rendering them useless at times between Chicago and New York.

The system of the traction company consists of a single-phase road 77½ miles long, with operating potential on the trolley wire of 6,600 volts. Passing around the southern end of Lake Michigan it parallels for a long distance the Lake Shore and Michigan Southern Railway and the wires of the Western Union and Postal Telegraph Companies. The Lake Shore and Michigan Southern uses the telephone to a considerable extent to supplement the telegraph in transmitting train orders, and it declares that the operation of the 6,600-volt overhead-trolley circuit by single-phase, alternating current is a serious hindrance in the use of both its telephone and telegraph wires.

Underwriters' National Electric Association.

Mr. Charles M. Goddard, of Boston, secretary of the electrical committee of the Underwriters' National Electric Association, has announced the appointment of sub-committees to consider the revision of the code, among which are the following: Committee on Rule 64, Signaling System, F. E. Cabot, chairman, 55 Kilby Street, Boston; Ralph Sweetland, 141 Milk Street, Boston; E. A. Fitzgerald, Box 298 Syracuse, N. Y.; C. H. Hill, 316 Walnut Street, Philadelphia, Pa.; Minor M. Davis, 253 Broadway, New York; C. C. Johnson, 195 Broadway, New York; H. S. Warren, 15 Dey Street, New York. Committee on Junction Boxes, F. E. Cabot, chairman, 55 Kilby Street, Boston; Dana Pierce, 382 Ohio Street, Chicago, Ill.; J. C. Forsyth, 34 Nassau Street, New York City. Committee on Wireless Telegraphy, F. E. Cabot, chairman, 55 Kilby Street, Boston; A. R. Small, 382 Ohio Street, Chicago, Ill.; C. E. Russell, 18 Western Avenue, Cambridge, Mass.

Mr. W. H. Stansell, the recently retired Western Union manager, at Johnson City, Tenn., in renewing his subscription says: "While I am out of the telegraph service probably for good, still I want to receive Telegraph Age as usual. There is no paper on the subject it treats that so thoroughly covers the entire field."

Press Rates to Glace Bay.

The Board of Railway Commissioners of Canada, as previously noted in our columns, recently decided against the London Times in its application to that body for an order to compel the Canadian Pacific Railway Co.'s Telegraph, the Great North Western Telegraph Co. and the Western Union Telegraph Company to transmit its press despatches to the Glace Bay, N. S., Marconi station at the same rates it charged Canadian papers for similar service. The full text of the decision of the commissioners, as printed in the Railway and Marine World, of Toronto, is as follows:

Upon hearing the application in the presence of counsel for applicant and the telegraph companies, the evidence adduced, and what was alleged, it is ordered that the application be dismissed.

Chief Commissioner Mabee gave the following judgment: "We have come to the conclusion that there is not sufficient information before the board upon which we would be justified in granting the order asked for by the applicants. They desire an order that the Canadian Pacific Railway Company's Telegraph, the Great North Western Telegraph Company and the Western Union Telegraph Company transmit press messages to the Marconi wireless station at Glace Bay at the same rate as is charged to other points along the Atlantic coast of Canada. They allege that while the usual rate on press messages from Ottawa to Canadian Atlantic coast points is thirty-five cents per one hundred words at night, and fifty cents per one hundred words in the day time, the telegraph companies charge private message rates on all press messages to Glace Bay intended for transmission by Marconi wireless, and that these charges are excessive and discriminatory. It appears from what took place in the discussion that there is in fact as between the cable companies on the one hand and the Marconi system on the other discrimination in favor of the former or against the latter. On the other hand, it seems that under the present existing rates as charged, that the sender of a message via Glace Bay over the Marconi system, as a matter of fact pays some twenty cents or thirty cents less to the land line for delivering at Glace Bay to the Marconi system than the same sender would pay to the cable company, as the share that the cable company under its existing contract with the land line would pay to the land line for the delivery of a message of the like number of words to the cable company at the coast, so that, in so far as the existing charges being discriminatory, and in favor of the cable companies as against the Marconi system, the facts are otherwise. As to the larger system of discrimination that was discussed by counsel as to the system now in operation being alleged to be discriminatory in favor of the American press as against the press of Great Britain or the transatlantic press, it is not necessary at present to deal with that question. The counsel who appeared in the case suggested that when the larger question of communication generally and the rates as applicable thereto was considered by the board, and in view of there being no sufficient information before us to deal intelligently with this application, we think that is perhaps the better disposition to make of that matter in the meantime. The attempt here is really to extend the existing system which was voluntarily established by the telegraph companies as to press rates. They have an extremely low rate apparently throughout Canada, and with their connecting lines throughout the United States for press purposes. These rates are applicable or intended to be applicable in so far as Canada is concerned to that class of business that is addressed to newspapers, for publication in the various towns and cities and villages in the Dominion. There is a press rate to Glace Bay. It is said there is a newspaper there, and so I presume that from other parts of Canada the press rates would apply to the publisher of that newspaper at Glace Bay. The attempt here is to have the board extend, against the will of the telegraph companies, this system of reduced rates for press purposes, in this particular instance, to the London Times, published in London, England. Now, we have no information whatever as to the reasons that moved the telegraph companies to establish these low press rates. We have no information whatever as to the profit of the telegraph companies, as to whether these rates are fairly remunerative or not, and we have no information as to the volume of business of that class. All of these would be most material to enable the board to say whether or not it was a fair thing to require the telegraph companies to give to newspapers published on the other side of the Atlantic rates upon a like basis. It was said that press rates could not apply reasonably to cable messages by reason of their being so condensed and so on, and that there was in some instances greater expense imposed upon the telegraph companies by reason of their having to have operators in the cable offices. All of these matters would have to be inquired into carefully before we could deal intelligently with the case and say whether or not transatlantic press rates should be upon the same basis as domestic press rates. This may be a matter that will be developed when the telegraph rates are looked into, as they probably will have to be before very long. All that I have said is, of course, quite apart from the question of jurisdiction that counsel raised, as to which in the meantime it will not be necessary for us to say anything. That feature of it may be deferred for consideration when the remainder of the complaint is more fully developed, so that we can dispose of it in a manner that we are unable to at present."

The Military Telegrapher in the Civil War.

PART XXIII.

At the breaking out of the war Henry Parker Bull, now of Albion, Neb., was manager of the telegraph office at Geneva, N. Y. H. W. Cowan, of Auburn, N. Y., a friend of his, entered the military telegraph service early in the conflict, and after serving for a short time and returning home on a leave of absence, gave such a good report of the service that he induced Bull to join the Military Telegraph Corps. During his military career he kept a diary of his movements and personal incidents of interest. This, together with some details which he gathered from memory he turned over recently to his friend, Frank Stevens, who served during the war as correspondent for a New York daily paper. The story as told in part by Mr. Stevens is as follows:

"Being stationed during the early part of his service at the War Department office, Bull soon tired of the routine and lack of excitement there, and asked to be sent to the front. His wishes were accordingly granted, and he was ordered to report to General Merritt's headquarters, near Culpepper Court House. He was there attached to General Sheridan's command. The army finally leaving this point to begin a movement which resulted in the Battle of the Wilderness, he was ordered to Brandy Station and remained there a short time only, when he was transferred to Alexandria, where he was employed as train despatcher under E. L. Wentz, who had charge of all the military railroads of Virginia.

"After several months' service at this point, Mr. Bull was sent to Manassas Junction to relieve Operator McKenzie, who became ill with typhoid fever at that point. One morning while he was stationed here Superintendent M. J. McCrickett stopped his train, which was en route to Thoroughfare Gap, and gave him some messages to send. At dusk that night the train returned, bearing the dead bodies of McCrickett and several of his men. Mosby's guerrillas had drawn the spikes from a rail, fastened a piece of wire to the end, and hidden in the bushes. As the train drew near they pulled the rail out and the engine and cars rolled down a steep embankment and five or six of the party were killed in the wreck and by the bushwhackers, who immediately began firing on the party.

Soon after this the office at Manassas Junction being closed, Mr. Bull was sent back to Alexandria, but remained there only a short time when he was ordered to go to Harper's Ferry. With the aid of a detail of five men given to him for that purpose, he built a line to the railroad headquarters on the island and opened an office in a box car. A few days later General Sheridan came into the car, sat down on his elegantly upholstered easy chair, made from a soap box with a piece of board nailed on for a back, and writing a few telegrams told him to rush them. Needless to say that Mr. Bull was not slow about sending them, especially when there was a cavalry general around. This was while Sheridan was en route to Winchester and his famous twenty-mile ride.

"As soon as the telegraph line was open from Harper's Ferry to Winchester, General Sheridan, enraged at the fate of Superintendent McCrickett, issued orders that if the track or telegraph wires were again injured in any way, he would burn every house, store and barn for half a mile each side of the track. As many of the guerrillas lived in this section these orders were very effective and this line was never afterward disturbed.

"Shortly after the assassination of President Lincoln, Mr. Bull was transferred to Winchester, where he remained until after the military lines were turned over to the commercial companies."

Mr. Bull's story, as related by Mr. Stevens contains many interesting anecdotes of General Sheridan and of experiences in army life, which, having no bearing on the telegraph, are omitted.

Daniel Murry, who served as a military telegrapher during the Civil War, in writing to Colonel William R. Plum, historian of the Society of the United States Military Telegraph Corps, in 1878, gave the following account of his experiences while connected with the military telegraph service:

"At the beginning of the war I was operator at Benwood, W. Va., for the Baltimore and Ohio Railroad. When the three-month troops came into West Virginia, every one was supposed to be a secessionist, and I was relieved by another operator. Meeting General Stager there, he desired me to go to Buchanan, W. Va., and join the military telegraph service. I declined, and he tendered me a position in the Cincinnati city office, which I accepted in May, 1861. In August of the same year I in company with Mr. A. Powell, of Adrain, Mich., went south and joined the military service. Captain Samuel Bruch, of Louisville, Ky., sent us both to Battle Creek, Ala., eighteen miles below Chattanooga, to report to General A. D. McCook, relieving Gus Fuller, who is now night chief in the Indianapolis office. We were both cipher operators. In September, General Bragg's forces crossed the Tennessee River, and Buell's army received orders by telegraph to move out after him, which was done quietly at night, leaving a force of 600 for a blind. Our tent was one mile from the fort the soldiers were in. We tried unsuccessfully to build a line to the fort on bottle necks, and were compelled to remain outside of the picket lines. One day William Gunther, noted guerrilla, was reconnoitering, and seeing a lone tent was about to ride down and see what it was when, by accident, one of us stepped out, he and his squad thinking it an ambush, wheeled and rode away. A negro came and told us how near we came to being captured.

"On or about the fifteenth of September, Cheatham's division camped on the opposite side of the Tennessee River and opened fire on us with shell. Colonel Leonard Harris, commanding the small force, rode up and told us to get our household goods in readiness to move. It was but a few minutes later when a shell exploded and knocked our tent, etc., all to pieces. We were under a heavy fire all that day and the following night we muffled the wheels with tents and stole away while still under fire and while the rain was coming down in torrents. I was fortunate enough to catch a stray horse and rode all night. When daylight came I discovered my horse's rear end, tail and all had been shot off. We made our way to Dechard, Ala., bare-footed and worn out. General Buell was camped there with Philip Bruner and Patrick Malaskey as operators. Buell sent for McCook's two operators, and when we reported he put me to work, saying his operators were worn out. I, more dead than alive, went on duty, and after receiving a large quantity of matter from Nashville was given my breakfast, the first I had eaten in two days. I was determined to join McCook, one of the best generals I was ever with, but I did not see any chance of getting away until Buell was ready to move. We were furnished with horses and about to start when it began to rain, so we took a train to Murfreesboro, where I left Buell and joined McCook. As we were covering the retreat from there to Nashville, I was ordered to relieve all operators as I came along, send them in to Nashville, and destroy the line as much as possible. We kept close to the line of march. I cut in at night, receiving our orders, and slept on my horse during the day. Nothing worthy of note happened on our march to Louisville, and upon arriving there I was ordered to Fort Mitchell, three miles from Covington, Ky. I was there under General Judas when we had a brush with Forrest, and also under Colonel Benjamin Runkle after Judas was removed. When Buell's army was ordered to move south I joined McCook, four miles from Louisville. I stopped at Lebanon Junction and hid in the garrett of the hotel with a relay sending valuable information while the place was occupied by Confederate General McGruder. I again joined McCook while the Perryville fight was going on, and stopped at Lebanon until he moved again. At Danville I was ordered to take charge of the office. While I was there William Atwater was at Lebanon, and we had a private signal. General Baird's brigade was stationed at Danville. Morgan was operating around him, and his telegrapher, Ellsworth, tapped the wire and commenced sending a message to General Baird to move his command. I detected the strange sending, and told him he was played out on this string. He said: 'You are mighty suspicious. Take this message or I will report you!' Report if you want to; I know who you are. He asked if General Baird was there, but I told him he couldn't find out through me, to come and see. He said, 'I may be played out on this string, but, Dan Murry, if ever I get you I will play you out.' Morgan's intention was to come through Danville if he could get Baird to move away.

"After remaining at Danville one year I was sent to Memphis under W. G. Fuller, and worked at nearly every station on the Charleston road, under Logan, Grant, Sullivan and others. Nothing of note happened during my stay in that department. Getting a furlough I came home to Wheeling, just in time for the Jones and Emboden raid. General Washburn was in command of our forces at Wheeling. Jones had captured those operators on the Baltimore and Ohio Railroad who had not ran away. I went to see depot agent, J. B. Ford, who knew me, and he said I was just the man he wanted. He told me he wanted me to go out with some regular soldiers on the road, take an instrument and report back what damage had been done. I showed my furlough, thinking that would save me, but he introduced me to General Washburn, who said: 'Ah, ha; military operator, eh? This is a military necessity, and you must go.' We took coal cars, put seats in them, put an engine behind and started with one company of eighteen regulars, under Captain James Powell, and moved slowly, building the line as we went, and reporting damage until we came to a burned bridge at Barracksville. The captain gave me enough men to work a hand car and I proceeded as far as Mannington, where I found a lot of railroad men anxious to get home. I left the soldiers, taking the railroad men instead, and arrived in Fairmont before the Confederates had left. I gave my relay to the operator from Fairmont, whom I had met at Mannington, and he told me where he had hidden his. I waited until dark, found the relay, and went into the Fairmont office, attached the relay and worked in the dark, going out of the back window after gathering what news I could and informing General Washburn, who had by this time come as far as Mannington. The Confederates left the next morning. For this service the Baltimore and Ohio Railroad Company gave me a position at Grafton, where I remained until July, 1864. During the Gettysburg fight I was ordered to Baltimore to work the Frederick wire, and a 'roast' I did get. Everyone who was not scratched in that battle telegraphed the fact home.

"My furlough expiring, I went back to Kentucky and reported to Captain Gross. He sent me to Somerset, Ky., where it was unsafe to sleep in the office or leave instruments over night, the guerrillas traveling through that section frequently. I, however, managed to elude being captured, and was later sent to Burnside Point to relieve a sick operator. The line being cut by guerrillas I was furnished a squad of men and went to the broken end of the wire to send and receive for the post, delivering messages by cour-

ier until I received material to repair the line. I was once chased by a squad of 'Sue Mundy's' men, but I returned next day with a larger guard. I was compelled to transact the telegraph business under such difficulties for four or five days."

The First Wire Tapper.

The first telegraph operator in the world to tap a telegraph wire for war purposes was Emmett Howard, who since the early seventies has been a prominent and respected citizen of Memphis, Tenn. This feat was performed by Mr. Howard in September, 1861, while the Confederate army under General Pillow was concentrated at Columbus, Ky., and the Federal army was concentrated at Cairo, Ill., under General Grant.

On September 6, 1861, Grant's cavalry destroyed the telegraph wires between Cairo and Blandville, Ky. After their hasty return to Cairo, Mr. Howard cut the wire a half a mile south of Blandville, and, by using a small relay wire, concealed under the bark of a tree and leaves on the ground to prevent discovery, connected it with an instrument, which he located under a fallen tree in a deep ravine forty feet from the road.

Watching the instrument day and night, Mr. Howard was able to report to General Pillow the movements of the federal cavalry and other important matters for two weeks. At the end of this time he was ordered to report for duty at Columbus. When Columbus was evacuated, General Polk ordered him to remain at Hickman.

He was driven out of Hickman, along with many other citizens, by federal gunboats, but returned the next day and connected a wire with an instrument concealed in the woods about a mile from the town. For three weeks he watched the river and instrument day and night, reporting the passage of gunboats and transports to General Polk at Jackson, Tenn.

After the fall of Island No. 10 Mr. Howard reported to General Cheatham, just before the battle of Shiloh. A week before the fall of Memphis he was ordered to gather up at all stations, including Memphis, telegraph apparatus and material. He reached Grenada with a carload, which was of inestimable value, as nothing in this line could possibly be manufactured in the South. After this he was on outpost duty at Tupelo, Saltillo and other places.

Mr. Howard ended an honorable career as military telegrapher by transmitting the last official despatch of President Davis, containing 2,000 words, filed at Charlotte, N. C., and addressed to General E. Kirby Smith. This despatch contained instructions as to the disposition of fragments of the armies west of the Mississippi River. The courier detailed to carry the despatch was killed by shots from a gunboat and the message was lost in the river.

So far as is known and believed, Mr. Howard is the only living person who has knowledge of this interesting and memorable document.

At the close of the war Mr. Howard went to Columbia, S. C., where he accepted a position as manager of the local office of the Western Union Telegraph Company.

In the early seventies he went to Memphis and for twenty-five years held a similar position in that city. Of late years he has been engaged in the insurance business.

Telegraphers' Cramp in England.

The Postmaster-General of England has had under consideration the question of whether any steps can be taken to prevent the appointment of persons likely to be affected with telegraphers' cramp, and to prevent cramp among appointed officers.

He desires to emphasize the importance of the proper instruction of learners and the acquirement of a correct style of sending by all officers engaged in manipulative telegraph work.

The acquirement of ambidexterity in manipulation should not be discouraged, although there is strong reason to suppose that left-hand sending is merely a palliative against the oncoming of cramp, and that an officer liable to cramp will sooner or later develop it in his left hand as well as in his right.

At the larger telegraph offices the duties should be arranged on a system of rotation so as to give sorting clerks and telegraphers as much relief from Morse manipulation as the work will admit. This is especially desirable for officers who must necessarily be employed on the heavier and more important Morse circuits.

An Amusing Incident.

Signaling in all its branches by the international code, by the hand-flags, the semaphore, the Morse code, forms a part of the English naval officers' education. Quite an amusing incident occurred to an officer consequent upon his acquaintance with the last-named method, which is, of course, the same as the telegraph system. He was traveling on the train from Liverpool to Manchester in a carriage, of which the only other occupants were two very young ladies, evidently telegraph operators. Scarcely had he settled down to enjoy his morning paper when his attention was arrested by a tick-tick, tick-tick from the other end of the carriage. Presently he found himself listening and spelling out the letters as they were ticked off, and this is what he read:

First Girl: "Sailor."
Second Girl: "Undoubtedly."
First Girl: "Nice looking."
Second Girl: "Adorable."
First Girl: "Like to kiss him."

Before the second girl could reply, the officer, grasping the situation, had dropped his paper and ticked off on the window frame with the bowl of his pipe, "Come on, both of you!" The consternation of the girls can be better imagined than described.

Censorship of Railroad Telegrams.*

BY J. G. JENNINGS.
Superintendent of Telegraph, Rock Island Lines, Chicago, Ill.

When I was requested by the chairman of the committee on topics to prepare a paper on "The Necessity of Censoring Railroad Telegrams" it seemed to me, at first thought, so much had been said and written on this subject that it could no longer be treated as a matter for interesting consideration by our members. On second thought, however, I realized that while it may be an old subject, it should always be a new and very live one to keep before us at all times. Therefore, I will begin by saying that there are a great many angles in the censorship business to be considered before undertaking it.

First.—You must have the active support of your superior officer. Without this very essential aid a censorship system may as well not be started.

Second.—Once started, never let up. If you do, the usual mass of useless and unnecessary stuff, some of which would answer every purpose if sent by train mail, will be offered again within a very short time for transmission by wire.

All telegraph superintendents must realize how difficult it would be to organize and maintain a perfect censorship system unless the principal relay offices are under the direct jurisdiction of the telegraph department. For instance, take an office where the division superintendent, trainmaster, chief despatcher and other division officials are located—the operators reporting direct to the chief despatcher. If the operators at such a point are wise (and they generally are) they would hesitate a long time before sending in a single message, even though they see at a glance that the message could be handled as a mailgram without detriment to the business. On the other hand, if the manager at that office reports to the superintendent of telegraph he is, in a great measure, free from the petty persecutions operators reporting to the chief despatcher would be subject to, if he endeavored to carry out a general order to forward all messages to the superintendent of telegraph (after being sent over the wire), which, in his judgment, could have gone by train mail without detriment to the company's interests.

On the Rock Island Lines we have managers at practically all of the general superintendents' headquarters, reporting direct to the head of the telegraph department; and we can keep a fairly accurate check on every message handled on the wires, both through and local.

These managers have instructions to go through their files daily, pick out all the telegrams which appear to be unnecessary to be transmitted by wire, and forward them to the superintendent of telegraph. We do, of course, depend in a way upon the managers to properly censor all business handled at their offices, but not entirely so. Every time one of the telegraph department staff is at any of our relay offices he considers it a part of his inspection trip to go through the back files, picking out several days' business at random and see whether or not the managers are following instructions. We have, at times, found cases where a manager may, through a personal friendly feeling towards a division official, suffer from defective eye-sight in sorting out telegrams when he scans those sent by that particular friend of his; but when he knows that one of my assistants or myself are liable to drop in any time to check him up, he is very apt to keep his eye-sight up to standard at all times.

This censorship system is something we watch very closely on the Rock Island, and if we do not receive a bunch of telegrams from each one of our managers at certain intervals we find out the reason.

When these messages are received in my office one of my assistants goes through them carefully, and if in his judgment any of them will pass muster as telegrams they are returned to the manager. The others are sorted and one of our blank forms bearing the fac-simile signature of the general manager or second vice-president is filled out, affixed to the telegrams in question, and forwarded to the sender for explanation. This blank is signed by general manager for offenders in the operating department and by the second vice-president for the traffic and other departments. These forms are numbered and written up in duplicate, the original being mailed direct to the official concerned with the telegrams in question, the duplicate being retained in my office; and if, after a reasonable time, the original is not returned we send an urger for it, signed by the general manager or the second vice-president. Previous to adopting this plan all officials and representatives were notified by the heads of their respective departments to curtail their telegraphing over railroad wires to the minimum, as in a way it costs just as much to send messages via railroad wires as it does via the wires of the commercial telegraph companies. The circular letters were worded in such a manner as to leave no doubt upon the minds of those who received them as to the meaning of those instructions, and we immediately experienced a decided slump in the total number of telegrams handled. It was not long, however, before the unnecessary matter filed commenced to increase, and we then went after the offenders with the forms referred to, with the most gratifying results.

General superintendents, division superintendents and others in the operating department, know if they file a message for transmission that does not pass inspection an explanation for violating previous instructions will be demanded by the general manager. The same also applies to violations by representatives in the traffic department, explanations for which must be made to the second vice-president. They also know, by past experience, that it is not an easy matter to "hoodwink" these officials into accepting a perfunctory reply, as they often require a detailed explanation of the whole transaction lead-

*A paper read at the convention of the Association of Railway Telegraph Superintendents, at Detroit, June 23-25, 1909.

ing up to the sending of certain telegrams, and they have found it is not an easy matter to satisfy the general manager and second vice-president, as they have to be shown; and having this in mind, almost without exception, all of our officials, when the possible necessity of sending a message occurs to them, weigh the question very carefully before deciding to file it for wire transmission.

We do not stop on the censoring of telegrams alone, but we censor even legitimate telegrams as to the number of words contained therein. In the adoption of this practice we have saved thousands of unnecessary words being transmitted and the great money maker, time, which is applied to other important telegrams, making the service highly efficient. In other words, we endeavor to impress upon the mind of the maker of the telegram that it is purely a business proposition, and that it is unnecessary to display any Chesterfield characteristics whatever in its make-up; the words "please," "kindly," etc., as well as the two and three-letter words, are eliminated from the telegram, and it, when filed, is in as few words as is practical to the full understanding of the receiver.

We have three grades of telegrams, namely, pink rush and ordinary, and the operators are expected, and it is their duty, to scan their files and see that the "rush" telegrams do not get buried under the ordinary, or take their turn telegrams.

The "pink" telegram privilege is confined to the general superintendents and higher officials only, and this high-class business is not permitted to even see a "hook," as it is handed direct to the operator on the wire it belongs and takes preference over other telegrams, and no excuse, other than wire failure, will be accepted for delay in transmission. This being true, we can handle a "pink" telegram from the general office in Chicago to any general superintendent on the great Rock Island Lines within a space of five minutes, although one of whom may be located in Fort Worth, Texas.

In the wind-up I will say, we all know that "information is the life of transportation," and on a big system like the Rock Island, with its five trunk lines, composed of magnificent distances, it is highly essential that good, prompt telegraph service be maintained, and it can be accomplished by keeping "mailgrams," as it were, that are filed as telegrams, down to the minimum at all times, and censorship is the secret of such service.

Great North Western Telegraph Company.

The Great North Western Telegraph Company has commenced ticker service at Ottawa, Ontario. The instruments are operated from the company's plant at Montreal, over a number nine iron wire one hundred and twenty-five miles in length, and having a resistance of 2,500 ohms.

The New York stock quotations are furnished to brokers during the week and on Saturday afternoons all sporting results are furnished to newspapers, hotels, etc.

Standardized Equipment.*

BY E. J. LITTLE.
Superintendent of Telegraph, Great Northern Railway, St. Paul, Minn.

I am at a loss to understand why the topic committee should have selected us as the victim in connection with this subject, unless, peradventure they were cognizant of one of our past sins, which was the habit of purchasing telephone equipment more for its good looks and cheapness than for its good qualities.

No doubt many of us have been too prone to purchase various types of instruments in the past twelve or fifteen years from the numerous manufacturers, large and small, simply because they had some small improvement over that of other makes which we had previously purchased. The result has been that our lines are equipped with a conglomeration of "devices," added from time to time as our system grew and additional facilities were necessary.

This has been the cause of complaints and criticism from other departments, to say nothing of the troubles of our linemen in endeavoring to keep the lines in working condition.

An inspection of our telephone lines a few years ago developed the fact that four or five different types of instruments had been installed on some of them; a few Viaduct, a Victor, a Standard, an Ericcson and perchance a Stromberg-Carlson or a Kellogg. None of the parts of one would fit the same part of another, and as the division lineman was unable, in a great many instances, to make repairs, not having the necessary material on hand, the defective instruments were shipped in and new ones ordered to replace them. In a great many cases the defective instruments were placed in the scrap heap as the cost of new parts, with express charges, would not justify us in making repairs. Had our equipment been all of the same kind or, rather, had we adopted a standard, there would have been little or no loss, as the parts of the instruments that were not defective could have been utilized in making repairs. This is one very good reason why we should standardize our equipment.

I presume many of you have had somewhat similar experience, and, no doubt, you will agree with me that the question of standardizing equipment is one worthy of close study and consideration, not only in the telegraph department, but in all other departments of a railroad as well.

More especially is this true of the telegraph department now that the telephone is displacing, to a considerable extent, the telegraph equipment both for train-despatching purposes and for the handling of commercial and railroad telegrams.

Unlike the common Morse instruments used for single transmission, the telephone and the various selective devices now on the market are of more or less intricate construction, requiring much more

*A paper read at the convention of the Association of Railway Telegraph Superintendents, at Detroit, June 23-25, 1909.

intelligent supervision than the telegraph or the ordinary telephone, and when we consider the fact that this equipment will, to a certain extent, be placed in charge of the ordinary telegraph repairmen who have had little or no experience in the maintenance thereof, the importance of having the least variety of these devices cannot be overestimated.

Where our equipment is standardized, it will be a very easy proposition to educate these men in the installation and maintenance of the apparatus, enabling us to materially reduce the cost of operation, as it will avoid the necessity of employing a force of skilled telephone men, not only to install, but to make ordinary repairs and remove trouble.

It can be readily seen that if your equipment is not standardized and your line is equipped with a variety of selective and telephone apparatus, all having a different method of wiring, adjustment, etc., the matter of educating your division line repairmen is going to be a very difficult one.

This is more especially true where we are continually making changes in our repair forces, which makes it necessary to educate new men at frequent intervals.

After a few practical demonstrations the average lineman is generally able to absorb the information imparted to him as to the manner of installing, testing out and locating defects, adjusting and cleaning the various contacts, and where your equipment is all of the same pattern, wiring, etc., identical in all offices, this means not only the prompt removal of trouble and restoration of your service, but also economy in operation of your train service, and as stated before, obviates the necessity of maintaining a force of skilled electricians as repairmen.

While I recognize the fact that in the present state of evolution of the selective signaling devices, it may not be practicable or desirable to standardize this part of your equipment, I am of the opinion that we should standardize the other portion of the apparatus, i. e., the telephone transmitter, receiver and all other apparatus that is not part of the selective signaling device.

In addition to the question of the labor cost of maintenance, is the one of the cost of material which is necessary to keep in stock at various points on the line to replace defective parts of the telephone equipment.

Although the greatest of care may be exercised in the manufacture, and the closest inspection by skilled mechanics and electricians made, of the apparatus before shipment, defects are liable to develop from time to time; damage may be caused by careless handling or maliciousness on the part of employes; lightning may burn out or practically destroy certain parts; or, which frequently occurs, the damage may have been occasioned in transit from the factory to point of destination.

The amount of such stock, material or parts will depend on the number of stations equipped. If your equipment is not standardized, it can be readily seen that a large variety of material will have to be purchased for the purpose mentioned. This not only means considerable money tied up, but is very liable to cause confusion and delay in shipping out replacements, through misunderstanding on the part of the shipping clerk as to just what make or style of apparatus the parts ordered are intended for.

So far as our system is concerned the managers of our relay offices will have charge of the telephone train-despatching circuits; will keep the necessary stock on hand to replace defective parts, and will furnish parts to division linemen from time to time, when called for.

In regard to standard equipment for our telegraph service, fortunately (or possibly unfortunately) the telegraph company furnishes all of our equipment for telegraph wires and we are generally compelled to take whatever they decide to furnish.

We have, however, adopted a standard arrangement for installing the switchboards in our larger terminal stations where brick or stone is used in construction. Our wires are conducted into the building in loricated pipe, placed in an eight-inch tile conduit. A recess three by three inches, six inches deep, is provided in a convenient location inside the office, from which conduits lead to the basement and to the instrument table. An adjustable steel frame is provided, to which the switchboard is attached, and that part of the face of the recess not taken up by the switchboard is filled with oak paneling.

The adjustable steel frame is hinged to one side of the steel frame of the recess, so as to permit of the inspection of wires. The cable leading from the pole line is connected to a distributing board and the wires conducted from the distributing board to switchboard binding post with flexible wire spiraled.

The Barclay Printing Telegraph System.

The article covering the Barclay Printing Telegraph System, written by William Finn of this city, and which has been running in series during the past nine months, was brought to a close with the issue of March 1. This interesting subject required eighteen installations in its recital, which was told with abundant and elaborate illustration, the first installment having appeared June 16, 1908. There has been a steady demand for the numbers containing this splendidly descriptive article of a device that has already gained wide recognition and acceptance in this country. In consequence there are only a limited number of back issues now available, hence those who desire to preserve complete files of the paper containing a full account of the Barclay Printing Telegraph System, will consult their own interests by ordering without delay any numbers that may be missing. We will furnish all of the issues from June 16, 1908, to March 1, 1909, inclusive, until the supply is exhausted, at three dollars, sent to any domestic address, postage or express charges prepaid. All papers over six months old are regarded as back numbers and cost twenty-five cents per copy.

The Commercial Development of Wireless Telegraphy.*

BY CLOYD MARSHALL.

Wireless telegraphy is rapidly taking its place among our commercial industries. While the past decade spans the entire development of applied wireless, yet its history dates much farther back. In 1842 Professor Morse sent signals across the Susquehanna river without wires. In 1864 Clerk Maxwell demonstrated mathematically the existence of the magnetic waves, and in 1887 Professor Hertz produced in his laboratory the electro-magnetic ether impulses, now known as the Hertzian waves. Sir William H. Preece was actively engaged in such experiments from 1885 on, and as early as 1886 he sent signals four and a half miles. In 1890 Professor Branly took out a patent on the metallic coherer, and the following year a patent was granted to Edison. Professor Dolbear, in the early eighties, conducted a series of valuable experiments, a record of which was published in 1881 in the Scientific American, and on March 24, 1882, he applied for a United States patent. To Professor Dolbear's practical work is attributable much of the rapid advance made by American inventors, and the writer is again reminded that America is foremost along these lines toward practical development and operation.

Upon the works of these men as a foundation, the inventors of commercial wireless apparatus, both in Europe and America, have built. Its mysteries have appealed strongly to the popular imagination, and expectations have been rather in advance of the art. In one way this has been beneficial, as it has spurred the inventors and designers to produce apparatus which will meet more and more exacting requirements.

This has resulted in a number of different systems bearing the inventors' names, and broadly divided into spark telegraphy and undamped waves. As with direct and alternating current, each kind has its partisans claiming all the real and supposed virtues of each, but each has its special field of excellence.

In spark telegraphy the electrical oscillations used in transmitting are produced by the discharge of a condenser across a spark gap. In the first devices used, the antenna or aerial was used as a condenser, this being charged by means of an induction coil and discharges across the spark gap. The discharge of the electricity in the condenser or aerial takes place at a very rapid rate.

The current surges back and forth across the spark gap until dampened out by the resistance of the spark gap and the radiation from the antennae.

With the plain aerial connected to the ground through the spark gap, the oscillations are heavily dampened, that is, they are entirely stopped after one or two complete oscillations. This plain aerial system is also limited to the amount of energy which can be used on account of the small capacity of the antenna or aerial.

*Abstract of a paper read at meeting of New York Electrical Society, June 16.

Due to these facts, inventors sought some means of using a greater amount of energy and consequently the closed oscillating circuits were brought into use. The closed oscillating circuit consists of a condenser and variable inductance and a spark gap, the condenser being charged from the secondary of the transformer or large induction coil. Due to the fact that condensers can be made any size, it is possible to use a great many times as much energy as is used by the plain aerial systems.

The amount of energy which a condenser is capable of storing in electro-static form is equal to $\frac{1}{2}$ KV^2, K being the capacity of the condenser, and V the voltage or potential. In the system using the plain aerial, the capacity of the aerial is as low as .00025, and never any higher than .002, except in extremely large stations. The capacities used in the closed oscillating circuits range from .0075 to .01, and in some cases where extremely long wave lengths are used, this capacity is even higher, as the capacity of the condenser in the closed oscillating circuit is a frequency determining element, or, in other words, determines the number of oscillations per second. The amount which may be used is limited by the shortest wave length required in operation. In practice the time of one complete oscillation is equal to 2π times the square root of LC ($2\pi\sqrt{LC}$), L being the total inductance of the closed oscillating circuit, and C the capacity of the condenser. The number of oscillations is equal to 1 divided by $2\pi\sqrt{LC}$.

The condenser generally has a fixed value, and is adjusted for the secondary of the transformer which is used to charge it. The variation of the frequency of the oscillation is caused by varying the amount of inductance included in the closed oscillating circuit.

It will be seen from these facts that with the closed oscillator, we have a generator of high frequency oscillations which is capable of adjustment with respect to frequency and is also capable of storing energy in the electro-static form between considerable limits, and converting the same into electrical oscillations of definite frequency.

Instruments are now in use with which in a few seconds one can determine the exact frequency, as well as other characteristics of the oscillating circuits. These instruments are called wave meters. The wave length of the electrical oscillation is determined by dividing its velocity through space by the number of complete periods per second. The velocity of the electro-magnetic wave through free space is the same as light. Its numerical value is 3 times 10^{10} centimeters per second, that is, if we have a frequency of 500,000 per second, the wave length in centimeters would be 3 times 10^{10} divided by 5 times 10^5, which is 3/5 of 10^5 centimeters, and is equal to 600 meters. In the closed oscillating circuit we have two devices which are capable of storing energy, the condenser, which stores the energy in electro-static form, and the inductance, which stores the energy in electro-magnetic form; that is, the closed oscillating circuit is capable of holding the energy for a considerable time and the

oscillations produced by it are not nearly so heavily dampened as those produced by the plain aerial. The closed oscillating circuit is a very poor radiator of energy, while the plain aerial systems are extremely good radiators for the electro-magnetic energy. It is thus apparent that the combination of the two, that is, the closed oscillating circuits for the production of the electrical oscillations, with the plain aerial or open circuit for the radiation of the energy would make a very efficient wireless telegraph transmitter. In fact, this is exactly what is done. The antenna or aerial and the ground are connected to some part of a closed oscillating circuit which has considerable difference of potential. The antenna or aerial is connected to one side of the inductance or capacity of the closed oscillating circuit, the other side of the same being connected to ground. In some cases this connection is an inductive one, or in other words, made by means of a transformer. This connection is called the coupling, and in practical operation the aerial circuit is so adjusted by means of variable inductance that it has the same natural period of oscillation as the closed oscillating circuit when they are entirely independent of each other. When this is the case, the aerial circuit, which is called in practice the radiating circuit, absorbs the energy from the closed oscillating circuit and converts the same into electro-magnetic waves. The practical wireless systems used to-day are constructed on these principles.

The oscillations generated by the system coupled in this manner are heavily dampened, that is they die out completely after from five to ten complete oscillations. This dampening or decay of the oscillations is due to three causes. The energy is used in overcoming the ohmic resistance of the circuit and the spark gap which converts it into heat, and also in the chemical action at the spark gap. From this it will be seen that the energy stored in the condenser of the closed oscillating circuit is converted into heat, chemical action and electro-magnetic or radiant energy, the electro-magnetic or radiant energy being the only useful part for wireless telegraphy.

In the system using undamped oscillations, these are produced by the discharge of a condenser through a resistance medium which has a negative temperature co-efficient, that is, the medium whose electrical resistance is lowered as the temperature increases, or, what is the same thing, this resistance is lowered as the current flow through it is increased. This current flow gives the necessary rise in temperature. This medium is also capable of having its temperature varied between certain limits at an extremely high rate. The best medium of this class and the only one used in practice at the present time is the arc. This arc either takes place between two carbon electrodes or between a carbon and a metal, or between two metal electrodes. To increase the rate at which the temperature of this arc can be varied, the arc must be surrounded by an atmosphere of hydrogen, or other means must be provided which will increase the heat conductivity of the medium surrounding the arc, or the electrodes of the arc.

The following is a description of the method of producing undamped oscillations:

Two carbon terminals or two suitable terminals are provided which are connected to a source of direct current through resistance and inductance. This is done so as to maintain the current flow through the arc from the feed circuit constant. The condenser has one terminal connected to one electrode of this arc, and the other terminal is connected through a variable inductance to the other terminal of the arc. When this arc is started by bringing the electrodes together the current flows through the arc, causing a high temperature conducting medium. Increasing the current through this arc decreases the resistance of the arc and consequently the voltage across the arc will be lower. This causes the charge which the condenser has taken up to flow out of the condenser through the arc, thus increasing the current and still lowering the potential. This continues to take place until the condenser reaches a certain critical low potential at which it stops delivering current, after which the arc immediately starts to assume its normal potential and the voltage across its terminals rises. This causes a flow of current into the condenser, and robs the arc of some current, causing a rise of potential at the arc terminals. This takes place until the potential across the condenser and arc terminals reaches the potential of the feeding circuit, and the previous operation is immediately repeated.

It will be seen from this that there is a surging into and out of the condenser caused by the variation of the potential at the arc terminals. This takes place continuously so long as the arc has the proper adjustment in respect to length, and also as long as the current from the feeding circuit remains constant. A slight change in either of these causes the arc to stop its operation. If the capacity and inductance and other frequency determining characteristics of the circuit remain constant, this arc will cause continuous oscillations to take place. Thus if the frequency determining elements of the circuit are such that a frequency of 500,000 is produced and the arc remains in operation for one second, there will be 500,000 complete oscillations produced. This condition is ideal in respect to tuning or syntonic telegraphy, but at the present time all these devices are limited in the amount of energy which they can use, and it is impossible to maintain them in working condition for any great length of time. For this reason the undamped waves have not come into very common use in wireless telegraphy. It has found its greatest use in wireless telephony. This is due to the fact that the frequency at which the oscillations take place are above that of audibility and consequently there is no note or noise produced in the receiver, except when the strength of these oscillations is varied. While in spark telegraphy the note of the primary frequency is distinctly heard, in fact one hears at the receiving end the same note as that produced by the spark in the transmitting end. With the undamped waves no noise is produced except a slight hissing at the transmitting end. The strength of the oscillations in the radiating circuit is varied by means of micro-

phones very similar to those used in telephony, except that they are constructed for considerably higher potentials and heavier currents.

In this explanation, I have attempted to show the difference between the two practical systems in wireless telegraphy and their respective advantages. At present the art is advancing so rapidly that we may expect a great stride in both of these systems in the near future.

The Telefunken or Quenched Spark Discharger.*

BY J. A. FLEMING, F.R.S.

As there seems to be an impression that the Telefunken discharger and that of von Lepel are identical, it may be well if I describe here, briefly, experiments which seem to prove that the operative principles involved in the two appliances are different. I explained in the lecture June 4 before the Royal Institution that when isochronous primary and secondary oscillation circuits are connected inductively or directly, as long as the spark endures in the primary circuit so long will those reactions take place which result in the production of a complex oscillation in both circuits resolvable into oscillations of two frequencies. I illustrated this by an experiment with two equal pendulums hung side by side on a loose string, and showed by means of my cymometer that in the similar electrical case of two equal coupled circuits oscillations of two frequencies were present. If time had permitted, it could have been also shown by the cymometer that these two oscillations were present in the primary as well as in the secondary oscillation circuit when using the ordinary spark-gap in the primary. The Telefunken discharger is based on the known fact that the damping of very short sparks is extremely large, and that if we can "quench" or stop the primary oscillations after one or two swings the secondary circuit then continues to oscillate freely with a single period.

The discharger that I used consisted of twelve round flanged plates of copper, five inches in diameter, the surfaces being turned true and having a groove in them. A mica ring is interposed between each pair of copper plates of such size that the mica half covers each groove. This groove is important, for without it the discharge spark tends to take place always at the edge of the mica. The mica is of such thickness as to make an air space of not greater than 0.01 inch between the flat copper surfaces. In this discharger we have then, say 11 air gaps, each about 0.01 inch wide and of circular section. When this discharger replaces the ordinary spark-gap in the primary circuit it damps out instantly the primary spark, and hence excites the free oscillations in the secondary circuit by shock. If, then, we place the cymometer alongside of the secondary circuit we find in it oscillations of only one frequency and not two. Also, if we place it alongside the primary circuit, we cannot detect in that circuit any oscillations, because they are so rapidly damped out that they have too small a mean-square value to affect the cymometer or cause the neon tube to glow perceptibly.

In consequence of this rapid damping it is possible to employ an alternator having a frequency of 1,000 to 2,000 to create a corresponding number of primary discharge sparks per second, without producing any true arc discharge. The rapid cooling of the discharge surfaces entirely prevents it.

The discs for this purpose are made of copper or silvered copper plates, and in the case of large discharges the discs are made hollow and water-cooled.

The rapid succession of highly-damped primary sparks creates then an equally rapid succession of very feebly damped trains of oscillations in the secondary circuit having a very large mean-square value, and therefore possessing many of the properties of undamped oscillations generated without any true-arc effect. The operation of this discharger seems to me therefore essentially different from one in which an oscillatory arc is created between metal surfaces by the employment of a continuous or direct current, neither is its operation dependent on the presence of an atmosphere of hydro-carbon vapor. On the contrary, it may be described as having the most perfect arc-quenching properties possible.

The Telefunken discharger could not, therefore, be placed in the circuit of the antenna, whereas the later mode of connection is quite consistent with a performance of a discharger which is essentially an arc method and not a spark method.

Three other properties of the Telefunken discharger deserve notice. It is almost noiseless, and, being entirely enclosed, could be used in an inflammable atmosphere. It seems, therefore, likely to be of use in balloons or airships, where an open or naked spark could not be employed. Finally, as the whole of the energy transferred to the secondary circuit expends itself in the production of radiation of one single wave-length it must be more economical than methods which generate waves of two wave-lengths, but capture at the receiver radiation conveyed by only one of these wave-lengths.

*Abstract of an article appearing in the Electrician, London, June 11.

We desire to state that back numbers of this paper, those issued more than six months prior to any current date, will be charged for at the rate of twenty-five cents apiece when they can be furnished. This price is fixed because of the necessarily limited stock we carry, and of the difficulty we sometimes have in filling an order. Oftentimes the request is for papers of a more or less remote date, with the expectancy of being charged at but ten cents a copy, whereas in order to obtain the desired issue we are ourselves frequently obliged to pay the larger sum, or even more. The growing value of complete files of Telegraph Age should cause our readers to carefully preserve their issues.

The Railroad.

Beginning August 1 the Russian telegraph system will make use of the twenty-four hour clock, the numerals after twelve to twenty-three being used to designate afternoon.

A patent, No. 924,968, for an electrical signaling system for railways, has been granted to C. Crandall, of Newport, R. I. For signaling engineers of locomotives by means of semaphores and wireless transmission from the line to an aerial on the locomotive.

Mr. H. B. Earling, who has just been appointed general superintendent of the Chicago, Milwaukee and Puget Sound Railway, began his career as a telegraph operator on the Chicago, Milwaukee and St. Paul Railroad in 1879. Mr. Earling is forty-seven years of age, and having passed through all the grades in the railroad service, is well equipped for the duties of his new position.

Mr. R. N .Young, of Winnipeg, Man., assistant superintendent of construction of the Canadian Pacific Railway Company's Telegraph at that point, accompanied by his wife ,was an attendant at the convention of the Association of Railway Telegraph Superintendents at Detroit. The name of Mr. Young was omitted from the list of attendants at the convention as printed in our previous issue.

A few of the superintendents of telegraph are devoting some of their time to investigating the merits of wireless telegraphy for railroad purposes. It is thought that in case of emergency the various division headquarters of large railroad systems could be kept in communication with one another by means of wireless when by reason of storms or otherwise the regular aerial wires are interrupted. The expense of wireless equipments is small compared with the service that could be obtained from their use in such emergencies.

Many of the railroad superintendents of telegraph have expressed themselves as much gratified at the successful convention held by their association at Detroit last month. They now feel that they have before them much new and interesting material for investigation which will redound to much good to the railway systems of America. The adoption of a new constitution will also facilitate the future work of the association, as the new instrument provides two meetings each year of the eastern and western divisions, which, together with the annual meeting, will afford the members five opportunities for the interchange of ideas which will be an increased benefit to the railroad service.

The beginning of a regular passenger and freight service to all points along the line of the Chicago, Milwaukee and Puget Sound Railway on June 15 marks the completion of another triumph in American railroad building. The construction of 1,500 miles of new road in less than two years across the Rocky Mountains from the Missouri River to Puget Sound, over a route requiring numerous tunnels, cuts and embankments in order to make as straight a line as possible, is an achievement of which the builders may well be proud.

Mr. U. J. Fry, of Milwaukee, superintendent of telegraph of the new system, has kept the construction of the telegraph line along with that of the railroad, and now has ample facilities to provide for the present demands. The telegraph department, which is known as the Continental Telegraph Company, has on the section from the Missouri River to Butte, Mont., a distance of 720 miles, the following wires: One copper wire for quadruplex use, three number eight iron wires for general telegraph purposes and two number twelve steel wires for block signal use. The two latter wires are equipped at each station with retardation coils in such a manner that they may be used in parallel to form a single telegraph circuit or can be used for telephoning from station to station.

From Butte westward, the equipment consists of two copper wires for telephone purposes, one copper wire for quadruplex use, one iron block signal wire and two iron wires equipped with retardation coils every one hundred miles to provide for their use as a single telegraph circuit or for telephonic communication between the points where the coils are inserted, and intermediate stations.

Legal.

The Appellate Court of Indiana holds, in a recent case, that the statutory penalty for failure to transmit a telegram is recoverable though the message was delivered orally to and taken down in writing by the company's agent outside its office, where it appeared that he filed the message in the office. Even though the telegraph operator be regarded as the agent of the sender of the message in writing it down and until the message was actually in the office of the company, yet when it was filed in the company's office by the operator in the line of his duty he ceased to be the agent of the sender, and became the agent of the company for whose acts it was liable.

Marconi's Telephonotypographe.

According to the Paris papers Marconi has invented an apparatus which he calls the "Telephonotypographe," by means of which words spoken through a wireless telephone are reproduced in writing at the receiving station.

The Parisian scientists are greatly interested in the report of this invention, which not only is regarded as feasible but has long been expected.

Marconi is said to have admitted that the invention is practically completed and entirely successful.

He has been able, it is said, to transmit spoken words by his invention over a considerable distance. The receiving instrument takes the message without the aid of an operator.

Marconi's Wireless Telegraph Company, Limited.

The report for the period ended December 31, 1908, states, according to the London Electrical Review, that at the last general meeting sanction was given to the increase of the capital by the creation of 250,000 seven per cent. preference shares of £1 each. The public issue was duly made, and 125,080 preference shares were subscribed for. Although this amount was short of the sum necessary to carry out the entire programme outlined in the prospectus, it was, nevertheless, sufficient to meet the company's current engagements and to provide for the expenditure required to complete the transatlantic stations at Clifden and Glace Bay, and, in addition, allowed the carrying out of a scheme of reorganization of the works. The works have now been placed on a thoroughly profitable working basis. The close attention of the directors has been given to the completion of the transatlantic stations at Clifden and Glace Bay, which has occupied a large portion of Mr. Marconi's time, and, although there have been serious delays in the delivery of important sections of the electrical plant, it is now a matter of great satisfaction to the directors to be able to state that the Clifden station is actually complete and fully able to carry out the transmission and reception of transatlantic messages to the extent stated in the prospectus issued on May 29, 1908. The accounts cover a period of fifteen months. The directors thought it advisable to make the company's annual report and accounts synchronize with the calendar year; hence the delay in publishing the report. The directors regret that at present they are not able to declare a dividend. They feel, notwithstanding this, that the prospects and position of the company are now highly satisfactory and promising, and they confidently anticipate that the dividend-paying period will speedily be entered upon. The remunerative business is extending in every direction. Economies have been effected wherever such have been found possible. Expenses have been cut down in all directions, and the field of profitable operation is steadily and persistently extending throughout the world. The fears which they at one time entertained that the ratification of the Berlin Convention by His Majesty's government would be detrimental to the maritime business of the Associated Marconi Companies have so far not been realized, and, indeed, a considerable addition has been made to the number of ships fitted and working the Marconi system. The directors call attention to the utility of wireless telegraphy in the case of ships in distress, which has never been more strikingly demonstrated than in the accident which resulted in the loss of the White Star liner Republic on January 23. Still more recently the wreck of the Slavonia has afforded another opportunity for demonstrating the gratifying extent to which the wireless system may be utilized in the saving of human life.

Strange Ideas About Wireless.

There is a common idea that often the air is so "jammed" with wireless messages that they get horribly mixed. For instance, one is supposed to have come over like this: "Order 600 Steel at closing price for dinner at 8 Waldorf." E. T. Edwards, chief operator of the wireless station at Sea Gate, L. I., in a recent interview ridicules such errors.

"Impossible," he said; "such mistakes never occur. Imagine yourself on the floor of the Stock Exchange, with everybody yelling at the top of his lungs. You have asked someone a question regarding the quotation of some particular stock. Somebody says 80½, somebody else says 62¾. You know instantly which message was intended for you, because you know the approximate cost of your stock. So, by the natural sequence of the wireless message, one can invariably tell if the message received is as it was intended, no matter what the "jam" may be in the air.

"Even to-day people know little about the principles of the system beyond the fact that it has something to do with air waves, and they cling to the notion that there must be some connection between the ships and the stations other than these air waves."

Illustrating the strange ideas people have about wireless telegraphy, Mr. Quinn, assistant to Mr. Edwards, related the following:

"I was stationed," he said, "on the steamship Bruce, carrying mail between Port au Basque, N. F., and North Sydney, C. B. One day a party of Newfoundlanders boarded the vessel and seemed very much interested in the wireless apparatus. I gave them what I supposed was a comprehensive explanation of the system. After I had finished one man in the party came up to me and said, 'But, say, isn't it cold up on the top of that pole?' 'Yes,' I said, 'I suppose it is, but why do you ask?' 'Because,' he said, 'I was pitying the poor operator in winter who had to climb to the top to get the messages down."

"But that," said Mr. Quinn, "isn't as bad as the mistake a really intelligent looking woman made. It was during the time when the coherer receiver was used. This receiver had a paper tape and inking brush and was worked rather like the tickers which the brokers use to-day. The tape recorded the dots and dashes. This woman seemed to grasp perfectly all that I explained to her, and I was quite elated with her perspicacity until she asked: 'Tell me, how does the tape get from the ship to the station without getting wet?'"

ROBERT W. MARTIN.

An Appeal to the Chivalrous Spirit of those Engaged in the Telegraphic, Journalistic and Related Fields of Activity.

BY WALTER P. PHILLIPS.

Robert W. Martin, bright, genial, witty and telegraphically talented beyond most other men of all times and localities, is critically ill. It is now nearly three years since he was stricken with apoplexy, while employed in the telegraphic department of the New York Herald, and through the assistance of a few of his old friends, including the always open handed Thomas A. Edison, Mrs. Martin and her daughter have struggled along, patiently and in silence, making the best of a difficult situation through the trying years of sadness, sorrow and never ending expense.

There are probably hundreds of men who have known "Bob," personally, or by reputation, to whom will come as news, the information that he has long been ill and his family in straitened circumstances and among them, I believe, there are many who will be glad to send a money token of their regard for the benefit of this remarkable man. To all such, I drop the hint and to those who cannot afford to give, I suggest the writing of a cheery letter to Mrs. Martin in care of Telegraph Age, to whose care remittances may also be made.

I am not accustomed to writing appeals of this kind and am not performing that office, perhaps, with as much skill and effectiveness as the subject warrants; I speak rather with the thought in mind that there must be quite a number of men, particularly among those who were associated with Mr. Martin and me in the service of The United Press (No. 1), and among the surviving members of the United States Military Telegraph Corps of whom he is one, who feel as I do, when I open my purse and in doing so thank the God of my fathers that it is I who am the donor instead of being the one whose circumstances make a demand, as Mr. Martin's do, upon the good impulses of my fellow men.

Mr. Martin is on the decennial lap that brings into view his seventieth milestone upon the thronged highway of life, and if he looks about him, as he may sometimes do, expecting and not receiving the touch of hands that have vanished during his illness, he must feel, with Lamb, that

"All, all are gone, the old familiar faces."

Let us convince him that some of the familiar faces still have an encouraging smile for him and his, and that not every voice is stilled.

Seeing him now so changed, mentally and physically, I recall with pride and pleasure, the jaunty air, the elastic step, the cheerful voice and attractive personality of him of whom my old associate, John E. Wright, once said to me: "Bob is forty-six years old, today, and he can send forty-six words in a minute or any number of bunches of forty-six words that are called for in a corresponding number of minutes, even if their number runs into hours." The nimbleness of "Rm's" fingers and the surpassing beauty of his chirography had behind them a sprightliness of mind and a fluency as a writer that made him one of the most valuable of men, whether his duties were in the telegraph office or the editorial room and, under all conditions, he was a humorist first of all.

I cannot better illustrate this, for the benefit of the younger generation, who did not know him in his prime, than by offering for republication in Telegraph Age, the appended, which appeared in 1888, in a journal then issued in the interest of newspaper writers and their kind:

BOB MARTIN'S FIRE REPORT.

Not long ago, General Manager Phillips, of The United Press, summoned several of his outside managers to New York for a Sunday conference, and he delivered to them a lecture as to the proper way in which to prepare news for the wires. He was especially caustic in his remarks as to how fires are generally reported. Mr. Robert W. Martin, who has charge of the foreign service of The United Press, and has no direct connection with the domestic service, was not invited to be present at the conference, but he heard of it, and to show that he was in sympathy with the movement, he has since submitted his views on the subject of fire reports in the following despatch:

VALLEY STREAM, L. I.,
March 20, 1888.

A disastrous fire broke out at half past seven o'clock this morning in the two-story dwelling of our respected townsman, James Peterson, upon which, it may be mentioned, that public spirited citizen recently expended $65 in repairs, painting, etc., devastating the entire block. Edward Allen, who was passing at the time, on his way to work on the new town pump, gallantly rushed to the Baptist church, two miles away, and gave the alarm by ringing the new bell, which the congregation only a few weeks ago purchased with the proceeds of their very enjoyable and highly successful fair.

Upon being assured that the clanging of the metal-throated summoner of Christians to worship was an appeal to our ever-ready fire department to battle with the devouring element, the members of Deluge Engine Company, No. 1, with all possible speed, and from every direction, repaired to their new engine house on High street, and, seizing the drag-rope of their oft-tried and never-found wanting apparatus, which only last week was beautifully painted and decorated by our worthy fellow townsman, Peter Smith, the noble fellows dashed with reckless bravery toward the red tongue of flame which illuminated the sky.

With generous disregard of the fact that the bright red wheels and azure hued body of their splendid engine were being bereft of their lustre by the inconsiderate mud, the heroic firemen plunged madly on and ultimately reached the scene of the conflagration. There a never-to-be-forgotten spectacle met their eyes. Angry forks of flame shot forth from the devoted building, while dark clouds of smoke rolled sullenly heavenward. The hardy fire-laddies lost no time in getting to work, but the fact that the engine was discovered to be hopelessly out of order, together with the circumstance that the hose was found to be bursted in many places, and the unfortunate failure of the firemen to find a drop of water within a mile of the fire undoubtedly caused great inconvenience and possibly mili-

tated somewhat against their saving the building, which, together with the contents and all its occupants was entirely consumed. This result, however, is due in a very great degree to the fact that the house was almost entirely burned before the firemen arrived on the ground, and in no wise reflects on their efficiency.

The only one of the Peterson family who escaped alive was James Peterson, senior. An overruling Providence which miraculously supervenes to avert calamity to weak humanity led Mr. Peterson to engage in a game of chance at Coon Dam last night, thus removing him from danger. He was met on the road three miles from his late home as he was returning with his winnings at cards ($4) and gallantly rescued by the firemen.

Too much praise cannot be bestowed upon the members of Deluge, No. 1, for having prevented the flames from spreading to adjoining buildings, though in thus averting a possible holocaust they were perhaps assisted to a slight extent by the fact that the nearest house to the fire is three-quarters of a mile away.

Mr. Peterson's loss is $138.60, partly covered by insurance and his winnings at Coon Dam.

Ladies and gentlemen, let us do whatever each of us can afford for the man who, in health, could infuse a strain of jollity into prosaic existence as it obtains in the serious business of news gathering, by producing a spontaneous skit which obviously has more undiluted humor in it than many a labored page by the irrepressible and consoling contingent of professional humorists at whose head stands the towering figure, intellectually considered, of the veteran Mark Twain.

Bridgeport, Conn., July 6, 1909.

A committee to take charge of the remittances on account of the Martin fund has been selected, consisting thus far of Charles W. Price, of the Electrical Review, and John B. Taltavall, of Telegraph Age. Other members will be added and their names will be announced in our issue of August 1.

The Telegraph in Lancaster, Pa., in 1846.

Mr. R. A. Barton, manager of the Postal Telegraph-Cable Company's office at Lancaster, Pa., has recently brought to the attention of Division Superintendent Leona Lemon an interesting clipping from an old number of a Lancaster paper, which tells of the business transacted in that place by the Atlantic and Ohio Telegraph Company in 1846, when the telegraph was still a novelty. This record, which is taken from the journal kept in the office, mentions that on February 21, 1846, the receipts of the office reached the large sum of $7.92, though during the early part of that year they averaged between two and three dollars per week. On one day the journal recorded receipts of six cents. The receipt of this amount is accounted for in the following manner: The telegraph being an innovation at that time, and the people in Lancaster being anxious to see it in operation, would write their name on a piece of paper, the operator would send it to Harrisburg, or some other office on the line, and the operator there would retransmit it to Lancaster. The characters were then marked above the name, and the man was charged the nominal sum of six cents to see this wonder performed.

Book Reviews.

"Lessons in Telegraphy," by Charles Henry Sewall (D. Van Nostrand Company, New York. 88 pages, 14 illustrations), is a series of thirty-seven lessons, arranged as an elementary course of instruction in the art of sending and receiving Morse telegraph signals. The object of this series is not only to furnish the student with simple instructions for learning the art of telegraphy, but also to caution him what not to do and thereby prevent the early acquirement of defects in sending, which once formed are difficult to remedy later on. This book is not intended as a self-teacher, but rather impresses upon the student how difficult it is for any one to learn, without a competent instructor, the proper method of sending telegraphic signals with a key. The lessons given embrace exercises in both commercial and railroad work, and if the learner carefully follows the instructions therein, and possesses average aptness for the work, he will soon acquire a knowledge of the rudiments necessary for success in this line of endeavor. Copies of this book will be sent to any address upon receipt of price, $1.00.

"Telegraphists' and Telephonists' Note Book" (S. Rentell and Company, Limited, London. 120 pages), is a convenient pocket size hand-book containing much information of value to any one connected with the telegraph or telephone service. Among the subjects concerning which it gives useful data are: batteries, properties of conductors, construction of lines, galvanometers, relays, transmitters and receivers, induction coils, testing and adjustment of different types of apparatus. Price, 75 cents.

"A Handbook of Wireless Telegraphy," by James Erskine Murray (Crosby Lockwood and Son, London, 370 pages, numerous illustrations). The second edition of this valuable work, revised and brought up to date, is now ready for delivery. This book is intended for the use of those who, for reasons of business or pleasure, have already made themselves acquainted with at least some of the truths of the theory and practice of wireless telegraphy, and to whom, therefore, the ordinary technical terms will convey something more concrete than a mere definition in words. Price $3.50. Copies may be had by addressing J. B. Taltavall, 253 Broadway, New York.

"How Telegraphs and Telephones Work." By Charles R. Gibson (J. B. Lippincott Company, Philadelphia, 156 pages). This is a small book written in simple non-technical language, dealing with telegraphs and telephones, such as would be useful to those who are specially interested in those instruments. A chapter on wireless telephony, and a short discussion of the electron theory, bring the volume thoroughly up to date. Price 75 cents. For sale by J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

Morse Electric Club Outing.

The annual outing of the Morse Electric Club, which occurred at College Point, L. I., July 10, was well attended, over one hundred members and guests being present, and was thoroughly enjoyed by all in attendance. An especially enjoyable feature was the ride to and from the grounds on the cable tug "Western Union." The first event of the afternoon's programme was the ball game between the married men and the single men. This was umpired in an efficient manner by Belvidere Brooks, general superintendent of the Eastern division of the Western Union Telegraph Company, and finally resulted in a tie score of 11 to 11, but the umpire decided the game in favor of the single men in view of the fact that the married men had fourteen men in the field. There being no mask for the umpire's use, Mr. Brooks by effective use of a reinforced umbrella and by standing at a good side distance from the plate, managed to escape injury from the balls, the sun, the players and the spectators.

The ball game was followed by running races of various distances and classes. The most exciting of these was the hundred-yard dash for fat men, which was won by Captain Thomas F. Clark, of Boston, after a most desperate struggle.

The sports prepared both participants and spectators for enjoying to the fullest extent the bountiful repast which was spread before them at Donnelly's Boulevard Hotel. After the dinner a large number of prizes were drawn for those members who, by reason of feebleness, old age and other incapacities, were unable to take part in the athletic events. Among the private individuals and firms who donated the prizes, which numbered over fifty, were the following: Colonel R. C. Clowry, J. B. Van Every, J. C. Barclay, B. Brooks, A. R. Brewer, G. W. E. Atkins, Brookfield Glass Company (through B. M. Downs), E. M. Mulford, Thomas F. Clark, R. D. Brixey, John A. Roebling's Sons Company (through W. P. Bowman), James Kempster, H. E. Roberts, Surbrug Tobacco Company, Frederick Pearce, J. H. Bunnell and Company (through J. J. Ghegan), Western Electric Company, Wm. Marshall, John Forsythe, A. O. Wallis, Foote, Pierson and Company, and H. Thaw.

Among those present were:

Auburn, N. Y.—J. B. Wooster

Binghamton, N. Y.—E. A. Baird.

Boston, Mass.—T. F. Clark.

Jersey City, N. J.—F. S. Lewis.

Newark, N. J.—W. H. Spry.

New Haven, Conn.—J. T. Elliott, J. E. Jenkins and H. C. Gropp.

New Orleans, La.—W. A. Porteous.

New York—W. L. Apgar, W. J. Austin, J. R. Beard, J. W. Behre, J. A. Berry, James Brennan, B. Brooks, B. Brooks, Jr., Bruce Brooks, Robert Calef, Edward Cahill, Joseph Cahill, W. W. Cameron, J. T. Carberry, E. G. Carley, J. W. Connolly, M. R. Cockey, F. E. Coyle, J. J. Creamer, J. A. Dierks, Lewis Dresdner, H. E. Dunham, H. Faulkner, L. Fiedeldey, T. A. Finn, W. H. Finn, W. J. Finn, Wm. Finn, F. E. Fitzgibbon, D. J. Gallagher, F. M. Gallagher, J. W. Gibbons, W. Gibbons, A. C. Gibbs, E. P. Griffith, M. W. Hamblin, H. Hastings, M. J. Hayden, Gardner Irving, A. F. Kelley, James Kempster, M. H. Kerner, C. A. Kilfoyle, Frank Kitton, Alex. Klein, A. M. Lewis, F. W. Lineau, D. W. McAneeny, Joseph McCusker, J. McDonough, J. F. McGuire, Wm. Marshall, Patrick Milhauser, E. E. Morison, R. F. Murphy, R. J. Murphy, Col. William A. Murray, Albert Nachmann, Benj. Nachmann, J. F. Nathan, H. D. Nyce, M. J. O'Leary, Captain Olmstead, B. H. Reynolds, J. J. Riley, H. C. Robinson, George Roehm, T. Sanna, F. J. Scherrer, Charles Schudt, W. A. Schudt, Albert Segren, H. V. Shelley, F. J. Sheridan, John Simmonds, T. G. Singleton, H. W. Soutar, D. C. Sullivan, P. J. Sullivan, J. B. Taltavall, Charles Trippe, Herbert Van Every, J. B. Van Every, John Veitch, A. O. Wallis and J. Wiseman.

Messrs. F. J. Scherrer, R. J. Murphy and B. H. Reynolds are entitled to the thanks of all in attendance for the full measure of enjoyment which was shared in by all those present.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, POSTAL.

Charles E. Stump, manager of the Produce District office: Robert Mecredy, manager of the Commercial Stock Exchange office, and Morris Ruberg, of the Rowland department in the main office, attended the New York Branch Office Managers' outing, on June 26. They reported a royal reception and very enjoyable time.

William Hopkins, manager of the office in the mill district, has returned to duty, after being absent for several months, on account of illness.

R. S. Agney, manager of the office at 1413 Columbia Avenue, has been appointed manager of the office in the Arcade Building, vice D. F. Given, transferred to the main office. William Murdock, is acting manager of the Columbia Avenue office, vice Mr. Agney.

E. M. Barnes has been given charge of the Ledger office at night, vice T. R. Poppert, who has been transferred to the Bulletin office, C. F. Happersett, of the Bulletin, having resigned.

NEW YORK, WESTERN UNION.

A son has been born to D. J. Gallagher, of the Missouri Pacific Railway Company's office, who was formerly identified with the secretary's office of this company, and is well known by the fraternity throughout the city.

Harry M. Weidler has been appointed manager of the 449 West Thirteenth street office, vice T. Skidmore.

There have been numerous out-of-town visitors to the operating department during the past two weeks, among them being Captain Thomas F. Clark, chief operator of the Boston office. The

captain is about as well known here as he is at the "Hub."

All of the summer offices being open, a decided increase in the volume of business handled in this office is apparent. The work of handling the enormous traffic, however, is so systematically arranged under the direction of T. A. McCammon, chief operator, assisted by many able lieutenants, that the additional work of handling an increased business of from ten to twenty thousand messages a day causes absolutely no friction or confusion.

A story too good to keep is told about the well-known "Senator" W. L. Ives, dean of the operating department, whose acquaintances are to be found all over the United States. A few mornings ago the "Senator" decided to bring a new pair of trousers to his tailor to have some slight alterations made. He was on his way to the office and found the man of the shears and thread had not yet opened his shop, so Mr. Ives left the package in a store next door to the tailor's, to be sent in as soon as the tailor appeared. Through someone's error the package being mistaken for a parcel of laundry, was sent to a Chinese laundry a few doors away. The celestial placed the pants in the tub and they were duly washed and starched, and when the mistake was discovered they were finally returned to the tailor. The "Senator" has not yet finished "buying" to square accounts with a number of his friends.

Obituary.

C. C. Reynolds, an old-time telegrapher and train despatcher, aged fifty years, of Wheeling, W. Va., died on June 26.

Thomas Daly, aged fifty years, employed by the Western Union Telegraph Company at Worcester, Mass., died on June 26 as a result of heat prostration.

J. S. Brown, aged fifty-eight years, at one time telegraph operator in the Great North Western Telegraph Company's office at Montreal, died in that city on July 5.

J. O. Burns, aged seventy-seven years, who has been employed much of the time for the past thirty years by the Western Union Telegraph Company at Detroit, died in that city June 30.

Duncan T. Bacon, of Indianapolis, a member of the Society of the United States Military Telegraph Corps, died in that city July 1, aged sixty-six years. The record of Mr. Bacon's military telegraph service appeared in our columns May 1, 1908.

The Imperial Press Conference.

At the recent Imperial Press Conference, held in London, the Committee on Cable Rates and Press Intercommunication offered resolutions to the effect that it was urgently necessary that the Governments of the British Empire should take steps to increase the means and to reduce the cost of electric communication between the different parts of the Empire. Many plans to bring this about were discussed, the principal schemes advocated being Government ownership of all means of electric communication, and the extension of the use of wireless telegraphy. The general opinion of the conference being that the latter method could not yet be regarded as practicable, the discussion was narrowed down to Government ownership. This would mean state competition with private interests, which practically amounts to confiscation or the purchase of the latter.

The British Premier, Mr. Asquith, received a deputation from the conference and pointed out to them that the Government was entirely in sympathy with the general object of the conference for the reduction of cable rates, and especially the reduction of the rates on press messages. Regarding the existing cable companies, however, he said: "It must be recognized in fairness to the cable companies, that they have provided a world-wide system of enormous value to the empire at large, and that of recent years they have very substantially reduced the rates; but they are commercial bodies acting on commercial principles, and possibly—I throw it out for your consideration—the most powerful argument which the representatives of the press can use in favor of lower rates for their messages along these commercial cables would be the assurance of largely increased traffic, which, I am assuming, it would be in your power to give."

New Edition of Phillips Code Now Ready.

The new edition of Phillips Code, revised and brought up to date (March 16, 1909) is now ready for delivery. The popularity of the Phillips Code, by Walter P. Phillips, was never more apparent than at the present time. Its acceptance by the telegraphic fraternity, as a standard work of the kind, dates from its first publication, and the constantly increasing demand for this unique and thoroughly tested method of shorthand arranged for telegraphic purposes, has necessitated from time to time the issuance of several editions. The present edition was carefully gone over under the supervision of competent authorities. This "stanch friend of the telegrapher" is strictly up to date in every particular. It is declared that an essential qualification of a "first-class operator" is a thorough understanding of Phillips Code.

The price of the book is $1 per copy. Address all orders to J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

General Mention.

The Postal Telegraph messenger boys in one of the large cities are very thankful that on one of the recent warm days a wagon loaded with ice cream upset in front of the office. It is hardly necessary to go into details as to why they were thankful.

William T. Stead, the noted English journalist, has constructed a telegraph system in London by which he expects to communicate with spirits. A contemporary cruelly states that it looks as if Stead ought to get into communication with the superintendent of some good insane asylum.

Mr. W. I. Capen, general superintendent of plant of the Postal Telegraph-Cable Company, New York, in renewing his subscription recently had this to say regarding Telegraph Age:

"Sending you a subscription check once a year, for your excellent publication is a real pleasure."

Mr. H. A. Tuttle, vice-president and general manager of the North American Telegraph Company, Minneapolis, Minn., in renewing his subscription to Telegraph Age, says: "Your newsy paper is always a welcome visitor and it has our best wishes for continued success."

"The Hughes and Baudot Telegraphs," by Arthur Crotch, of London, the well-known electrical engineer and author, is a book that everyone interested in printing telegraph systems should possess. The volume contains a very full description of the two mentioned type-printing telegraph systems used so generally in Europe, the Baudot in France and the Hughes elsewhere on the Continent. The illustrations are numerous and clear, and all together, the book furnishes a fund of carefully stated information valuable to the student and also of interest to the lay reader. This book may be obtained of J. B. Taltavall, Telegraph Age, 253 Broadway, New York, and will be sent to any address, carrying charges prepaid, on receipt of price, $1.00.

The Book Department of Telegraph 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 principle cable codes, will be sent to any one asking for the same.

Opportunities in the Wireless Field.

At present there is a great demand among the wireless telegraph companies for efficient operators, and in view of the rapid extension of wireless service this demand is likely to continue for a long time. There seems to be a general hesitancy among Morse operators about taking up this work, although a good Morse operator can, with very little practice, accustom himself to receiving and sending wireless signals. The salaries paid to competent wireless operators are fully as large and perhaps larger than those paid in the wire service, and the chances of advancement are much greater. There is a general complaint among the wireless companies that the extension of the service is being greatly hampered by this difficulty in securing competent operators. One of the companies is even now on the lookout for a man to fill a position worth twenty-five hundred dollars a year and is unable to find any one capable of occupying this post, although there are doubtless hundreds employed in the wire service who could qualify for such a position if they would apply themselves to mastering the principles of the construction and operation of wireless apparatus.

Rubber Telegraph Key Knobs.

No operator who has to use a hard key knob continuously should fail to possess one of these flexible rubber key caps, which fits snugly over the hard rubber key knob, forming an air cushion. This renders the touch smooth and the manipulation of the kev much easier. Price, fifteen cents.

J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

A New Edition of Maver's "American Telegraphy."

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