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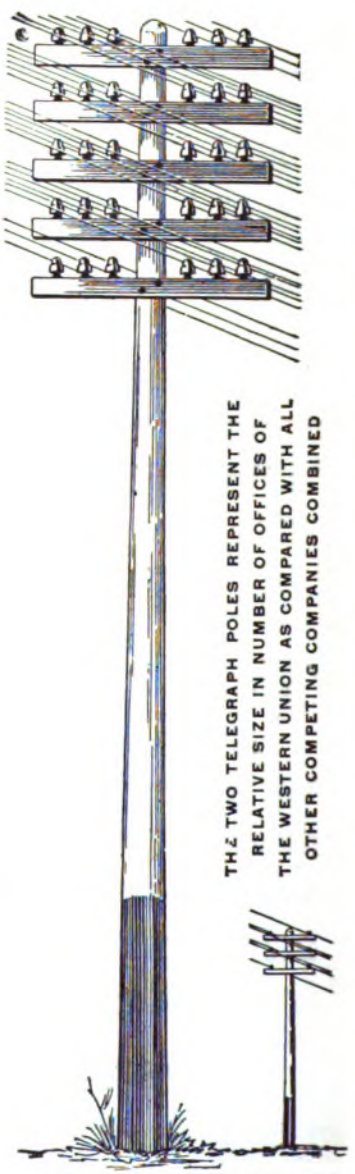

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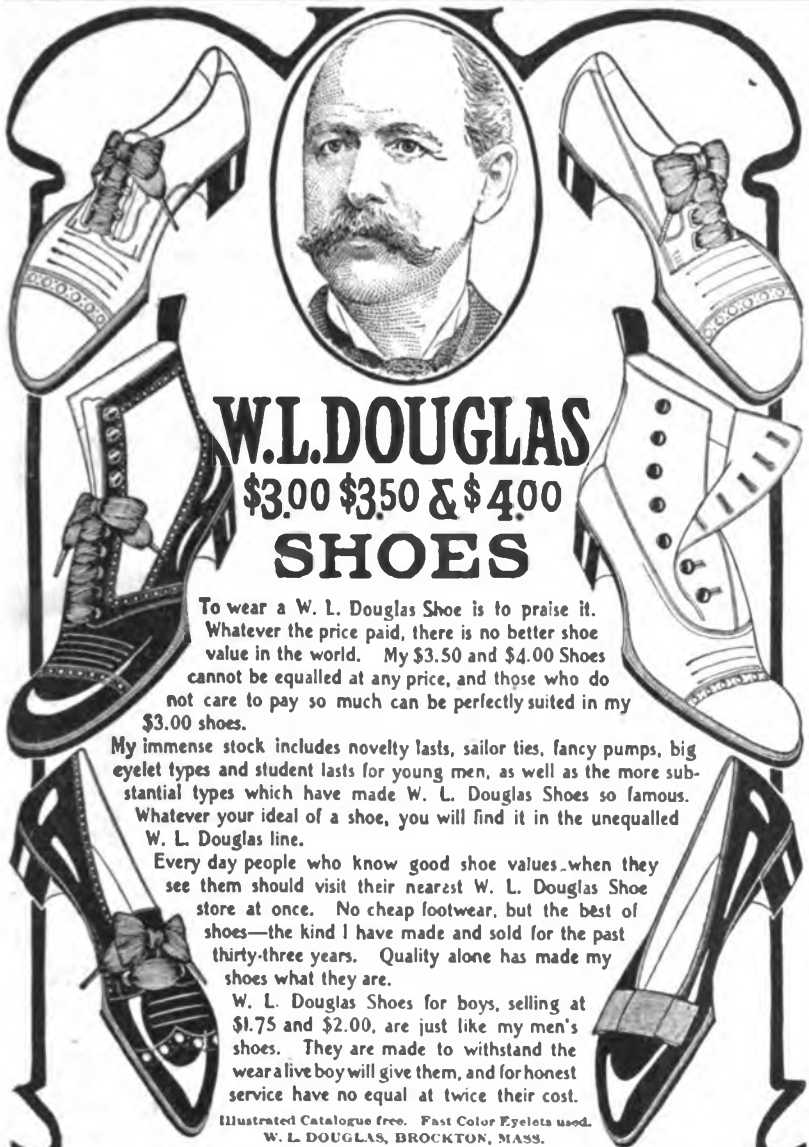

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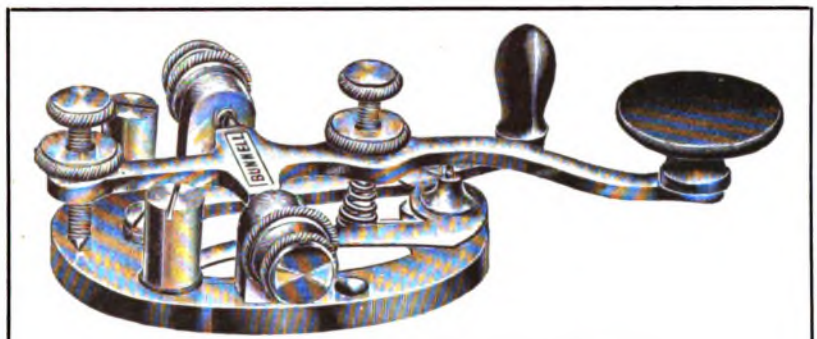

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TELEGRAPH AGE

No. 11 NEW YORK, JUNE 1, 1909. Twenty-sixth Year.

CONTENTS.

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Condenser.

PART I.

A condenser is an open circuit device which, through induction, accumulates a charge of electricity on the surface of the numerous thin metal plates of which it is composed.

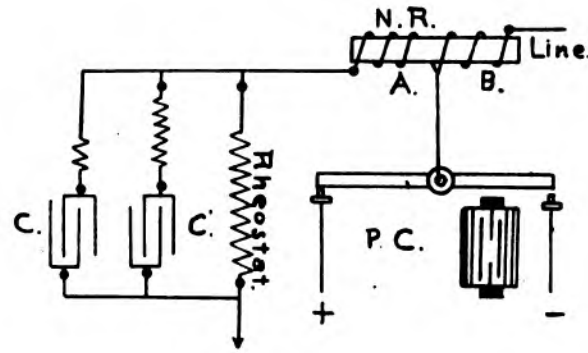
This charge in turn creates an electromotive force at the binding posts of such plates which becomes effectual as a current producer only when the charge is released.

It is not, therefore, as many students assume, a reservoir of current, but merely a means of creating current in any external circuit, with which it may be connected, during the activity of its electromotive force.

This active period occurs only at the moment the said charge is released; that is to say, when the charge accumulated on the plates flows back towards the source whence it came. It is obvious, therefore, that the action of a condenser is such that it is particularly useful in cases where a momentary current, supplied at the proper instant, will fill in an unavoidable gap or break in the current normally flowing in a circuit, where such current is liable to vanish or become temporarily interrupted at intervals.

As an example showing the use of a condenser in a case of this kind, its action and connection with a duplex or other multiplex circuit, as shown in the accompanying diagram, offers a good illustration. N R represents an ordinary neutral quadruplex relay differentially wound and possessing two coils A and B for the main and artificial lines respectively. The condensers C and C' are connected to the artificial line leading to the rheostat. P C is the polechanger which, when operated, delivers alternately positive and negative currents in the usual way.

Now it is well known that at the moment the polechanger lever shifts from one contact point to the other there is a slight mechanical break in



the circuit as well as a very minute period while the polarity of the current is changing, when no current from the battery can flow. At all other times the condensers receive current and stand "charged," but are inactive. The moment, however, the break or reversal occurs, the charging source vanishes and the released charge of the condenser flows back into the coil A of the artificial line and tends to magnetize the iron core. The reason this effect is desired is that as the long line conductor itself also empties its charge into the relay through the main line coil B at the instant such interruptions occur, the condenser charge is required to neutralize the resulting magnetic effect in the relay core which the incoming line charge itself would otherwise develop therein. It is obvious, therefore, that not only must the two charges of current flowing back into the relay from different sources be made equal in volume and set one against the other by being compelled to flow around the iron core in opposite directions, but the two forces must be compelled to meet in the common battlefield and fight it out at the same instant as otherwise the remedy would

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increase the disturbance instead of eliminating it.

This result is accomplished, first, through regulating the capacity of the condensers so that it equals that of the opposing line; and then by means of artificial resistance inserted between the condenser and the relay coil A, retard the action of the condenser in a degree equal to the duration of the period of time the long line conductor occupies in discharging its own released charge. The fact must not be overlooked that a long wire is in one sense itself a condenser and accumulates a charge of electricity in value in proportion to its size; that is to say, in proportion to its superficial area. Hence a large long conductor returns a greater charge under the circumstances stated than a smaller or shorter one would, other conditions being equal.

In like manner a condenser's capacity depends, among other things, upon the number of square inches of surface of all the tinfoil sheets which compose it. In other words, upon the superficial area of the material holding the charge. In order to meet the different requirements due to the varying lengths and gauges of telegraph wires generally, the condensers used in connection with multiplex circuits are usually made adjustable. That is to say, the sheets are divided into several separate lots and so arranged that only such a proportion of the total number may be used as the occasion demands. This arrangement obviates the necessity of instaling a number of different sizes of condensers in order to meet varying static capacities of the external circuits.

By referring to the accompanying diagram the reader will observe that between condenser C^1 and the relay coil there is inserted a certain amount of adjustable resistance, while condenser C route contains considerably less. This resistance is called the retardation coil and the amount required is found by balancing to the static by means of the metal plugs in the same manner that the large rheostat plugs are adjusted to balance the main line current. The retarding resistance is necessary because a long line conductor requires more time to discharge completely than a condenser. Hence it is obvious that should the condenser's charge not be held back it would reach coil A and magnetize the core before the line charge could all get there, and it would consequently miss the opportunity of neutralizing the effect of the static discharge.

Condenser C is permitted to discharge without being greatly retarded in order to meet the initial portion of the line discharge which instantly begins when the circuit is broken. Condenser C^1 is retarded by the resistance inserted, in order to prolong the effect which condenser C began, until the incoming charge has all arrived. On some multiplex circuits three condensers are used in order to give a still longer prolongation of this action, although the full capacity of any one of them may not be required. In such cases, condenser C and C^1 would be arranged as shown in the diagram, while condenser C^2 would require a still greater retarding resistance than C^1 in order to increase the effect.

(To be continued.)

Recent Telegraph Patents.

A patent, No. 920,833, for a system of telegraphy, has been granted to R. L. Dean, of Kansas City, Mo. Makes use of perforated tape which actuates a transmitter. The receiver is chemically treated paper.

A patent, No. 920,966, for a telautograph, has been issued to A. M. and K. Knudsen, of Chicago, Ill., and Grand Rapids, Mich. The device is provided with a transmitter, a receiver, a recording ribbon, a step-by-step ribbon feed and means for rendering the feed operative by lifting the tracing point of the transmitter from the writing table.

The following patents have expired:

Patents Nos. 474,230, 474,231 and 474,232, for a speaking telegraph, held by T. A. Edison, of Menlo Park, N. J.

Personal.

Bradford Shinkle, vice-president of the Hemingray Glass Company, Covington, Ky., manufacturers of insulators, died on May 7.

The retirement of Mr. J. W. Wilmot from the position of Controller of the Post Office Telegraph Factories in England, took place on May 1, and marks the close of a useful career, extending over a period of forty-seven years in the service of telegraphy.

Mr. L. W. Quick, secretary and treasurer of the Order of Railroad Telegraphers, was recently elected treasurer of the city of St. Louis on the Republican ticket.

Thomas D. Lockwood, electrical expert of the American Telephone and Telegraph Company of Boston and well-known old-time telegrapher and author, delivered an address at the May meeting of the Pittsfield Branch of the American Institute of Electrical Engineers on "The Satellite Systems of Primary or Pioneer Inventions."

Mr. U. N. Bethel, president of the New York and New Jersey Telephone Company, the Bell Telephone Company of Pennsylvania, and the Central New York Telephone and Telegraph Company, has been honored by the Emperor of Japan by having conferred on him the Imperial Order of the Rising Sun. This is in recognition of the assistance given Japanese engineers who have been investigating telephone conditions in this country.

Mr. Casper W. Dean, president of the C. W. Dean Company, manufacturers of bridges, New York, is an old-time telegrapher. He was born in 1844 at Milan, O., where so many other bright expert telegraphers and inventors saw the light of day for the first time. Mr. Dean was manager

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of the Cleveland, O., office of the Atlantic and Pacific Telegraph Company from the time it opened for business in that city until 1870, when he left the telegraph service to engage in the bridge business.

Mr. Albert R. Suesman, a native of Rhode Island, for many years manager of telegraph interests at Providence and formerly general western manager of The United Press at Chicago, and who was a soldier in the Army of the Potomac during the Civil War, has an interesting article in a recent issue of the New York Sun and which is going the rounds of the daily press, concerning his personal observations during the war. Mr. Suesman takes occasion in his article to pay a splendid tribute to Senator Aldrich, of Rhode Island, who served with distinction in the Tenth Rhode Island Regiment, and tells the following story concerning Colonel Zenas R. Bliss, who commanded that organization, as an illustration of the spirit which pervaded Senator Aldrich's regiment:

"At the battle of Fredericksburg, when in command of the Seventh Rhode Island, a new regiment, Colonel Bliss was seen to advance some eight or ten paces in front of his men while they were under a hot fire and tell them to 'dress on the line.' As he extended his arm in giving the order daylight could be seen through the holes in the cape of his coat where the bullets had passed through it."

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Nelson E. Church, manager of the Pittsburg office, has been advanced to the superintendency to succeed Mr. E. B. Saylor, resigned. Mr. Church was born at Newark, O., forty-eight years ago. For the past twenty years he has been in the service of the Western Union Telegraph Company, holding many important positions, at various places. For the past six years he has been manager of the Pittsburg office.

Mr. Gerald Brooks, son of and private secretary to Mr. Belvidere Brooks, general superintendent of the company, has resigned to accept a position with Hay and Boynton, brokers, of this city. Mr. C. H. Boynton, a member of the firm, was formerly general superintendent of The Associated Press, and is a son of Mr. Charles A. Boynton, superintendent of The Associated Press at Washington, D. C.

Mr. Morris T. Cook, of Chicago, who was appointed general agent of this company and of the American District Telegraph Company for the Western division, as announced in our previous issue, is one of the younger officials of the company, but one who has had an unusually valuable training. This has been obtained under the direction of his father, Mr. Theodore P. Cook, general superintendent of the company at Chicago. Mr. M. T. Cook was born at St. Louis, Mo., June 29, 1879, and entered the service of the company at Chicago, April 1, 1902, as secretary to the general superintendent, which position he has since held. Among the duties of the position of general agent to which Mr. Cook has been appointed he will give special supervision to the service, revenues and expenses generally of the company and to the messenger department of the American District Telegraph Company.

Mr. Robert W. Chapman, head of the bookkeeping department, owing to sickness has been absent from his office for some time past.

Mr. J. C. Smith, superintendent at Dallas, Tex., is increasing the facilities of the company in his district by the erection of several new wires connecting important centers.

For the fifteenth consecutive year Marion H. Kerner had the statue of Professor Samuel F. B. Morse in Central Park suitably decorated on Memorial Day, to commemorate the invention of the telegraph which has united the people of every land in universal brotherhood. The contributions to defray this yearly expense are made by a few loyal disciples of Professor Morse.

The Morse Electric Club of New York announces that its summer outing will occur at College Point, Long Island, Saturday, July 10. The cable tug "Western Union" has been placed at the disposal of the members of the club to convey them to the grounds, the boat making two trips at convenient hours during the afternoon to accommodate those desiring to go by water the entire distance.

A Barclay printing telegraph equipment which is now being installed on the New York-Kansas City circuit will be repeatered at Pittsburg and St. Louis.

Mrs. F. P. Howard, of Dallas, Texas, a daughter of Theodore P. Cook, general superintendent of the Western Union Telegraph Company at Chicago, died after an operation for appendicitis, May 17.

RESIGNATIONS AND APPOINTMENTS.

Mr. J. M. Muckleroy has been appointed chief operator at Galveston, Texas, vice George A. Clark, deceased.

Mr. John Bartness, an Associated Press operator, has been appointed manager of the Grand Forks, N. D., office to succeed Charles E. Rich, deceased.

Mr. A. G. Paine, for many years manager of the office at Goshen, Ind., has accepted a position in the Cleveland, O., office.

Mr. Nicholas Lee has been promoted to be chief operator of the St. Paul, Minn., office, vice C. A. Patterson, resigned.

Wire Facilities at Beverly, Mass.

Beverly, Mass., having been selected as the summer home of President Taft, the telegraph and telephone companies have greatly increased their facilities with this place. The telegraph companies are to have between forty and fifty

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wires, with direct service to New York, Washington and other centers. It is expected that most of the press matter will be sent from the regular telegraph offices, but extra press wires are to be installed in the government executive offices for the caring of the press matter that cannot be handled in the regular office.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Charles C. Adams, vice-president, and W. I. Capen, general superintendent of plant, were in Albany, N. Y., recently on business connected with the service.

Mr. H. G. Haddon, general manager of the Martha's Vineyard Telegraph Company, Woods Hole, Mass., was in New York a few days since on business connected with his company.

Mr. Isaac Smith, superintendent of tariffs, has returned to his office after a month's partial absence on account of his election as foreman of the Grand Jury of Passaic County, N. J.

The company expects to occupy their new office at Salt Lake City about June 1. It will be thoroughly up to date in every particular and its location in the Boston Block is one of the best in the city. W. P. S. Hawk, the superintendent of the district, will have his office in the same building. D. McNicol is the manager and the plans for the new office were prepared by J. F. Looney, of Chicago, division electrical engineer.

The company expects to move into new and much larger quarters at Columbus, Ohio, about July 1.

RESIGNATIONS AND APPOINTMENTS.

Mr. F. A. Morse, manager at Johnstown, N. Y., has been transferred to the management of the Gloversville, N. Y., office, vice H. A. Carpenter, resigned to engage in other business. Mr. G. W. Berry succeeds Mr. Morse as manager at Johnstown.

The Cable.

George Gray Ward, vice-president and general manager of the Commercial Cable Company, left New York for England, May 22, on the steamer Baltic. Mr. Ward goes to London to arrange for several changes in the company's service and for a new cable from St. Johns, N. F., to New York. Mr. Ward was accompanied by his wife.

Daniel D. Devereaux, an old time telegrapher, a native of Providence, R. I., and for the last twenty-seven years manager of the Western Union cable station at Duxbury, Mass., died suddenly of heart failure May 13, aged seventy years. Mr. Deveraux previous to his engaging in the cable service was for twenty-five years employed in the Boston office of the Western Union Telegraph Company.

Cable communication is interrupted May 28 with:

Madura Island (Dutch East Indies) Feb. 3, 1908

In the English House of Commons a few days ago the question of recent damage to submarine cables by trawlers came up for consideration.

In the course of the discussion, Mr. S. Buxton said that it had been reported to him that injuries to one of the transatlantic cables had recently occurred in the vicinity of Waterville, Ireland, and that they were attributed by the cable company to trawlers. He said that he appreciated the seriousness of those interruptions, and he trusted that the steps to inspect trawling gears which it was proposed to take with a view to minimize them would prove effective.

The King of Spain has authorized the establishment of a press telegraph service at the reduced rate between Spain on the one part and New York and Havana on the other, accepting the reductions proposed by the cable companies and reducing fifty per cent. the Spanish terminal rate. This service will be governed by the international regulations which may be in force.

We printed in our May 1 issue an item to the effect that the Western Telegraph Company was negotiating with the Argentine government at Buenos Aires for the construction of a new cable line to connect Argentine directly with Europe by way of Ascension Island. The form of contract has been approved by the Director General of Argentine and Minister of Communications, but has, however, to be ratified by the Argentine Congress which is now in session. On the ground of the contract being in the nature of a monopoly it is being vigorously opposed by newspapers as well as the German Government.

The French Cable Company on May 13 announced that direct cable communication had been restored with all points in Venezuela. This terminates the cable isolation which Venezuela has been under since January 12, 1906, during which time communication with the outside world has been carried on by mail and messengers to the near-by islands and at times by wireless to Curacao. The interruption began with the seizure of the French cable line by President Castro for the cable company's alleged complicity in the Matos rebellion against him. With the fall of the Castro regime the Gomez administration opened negotiations with the French company, which have now resulted in the restoration of communication.

Commodore E. Suenson, of the Great Northern Telegraph Company, in his annual report at the meeting of the company held in Copenhagen recently among other things stated that the reductions introduced by the International Telegraph Conference, at Lisbon, in 1908, were too small to be of any appreciable value to the public, but the loss of revenue to the telegraph administrations would be considerable. When, therefore, Utopians who are not satisfied with reasonable reductions demand a uniform rate of one penny a word, they are asking for the impossible. Fortu-

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nately, however, the sensible merchants prefer a good service to low rates, a fact which could not but assist cable companies in a possible competition with wireless telegraph companies, a competition to which holders of shares in cable undertakings are perhaps inclined to attach too much importance. The more extensive use of wireless telegraphy had accentuated the great defects of the new invention, particularly the facility with which telegrams can be tapped, whereby the secrecy of the telegrams becomes more or less illusory. The experience of the last year had, therefore, only tended to confirm their confidence in the absolute superiority of the old system of telegraphy by wire wherever practicable. The cable and wire manufacturers would hardly have had such a prosperous year if those views were not shared by the Governments and private administrations who adhered to the use of wires, submarine, underground or overhead.

Shilling-a-Dozen Telegrams.

Mr. Henniker Heaton's hallucinations on the subject of telegraphic communications, says the London Electrical Review, seem to be beyond the reach of cure without the aid of a surgical operation. Speaking at a dinner of the Imperial Colonial Club, May 7, he said he had hopes that within a few months it would be possible to send messages to every part of the British Empire at a cost of one shilling for twelve words. He had the particulars of an invention by which 60,000 words could be transmitted in an hour.

Mr. Heaton surely must know—but apparently he refuses to believe—that any such proposition as the former is at present absolutely incapable of accomplishment; to speak of it as being within the range of a few months is, no doubt, sufficient to bring a transient round of applause from an audience unacquainted with the true state of affairs, but that is all. As for the 60,000 words an hour, this looks like the Pollak-Virag system, which, as we have repeatedly pointed out, cannot possibly be used for submarine telegraphy. If Mr. Heaton is unable to grasp these facts, we can only offer him our condolences.

Municipal Electricians.

Arrangements are now well under way for the fourteenth annual convention of the International Association of Municipal Electricians, which takes place at Atlantic City, N. J., September 14, 15 and 16. The headquarters of the convention will be at Young's Hotel, on the corner of Tennessee avenue and the Boardwalk. Mr. A. C. Farrand, chairman of the committee of arrangements, is well fitted for this position, and if the visiting members to the convention do not spend an enjoyable and profitable time it will be through no fault of this gentleman. Mr. Frank P. Foster, of Corning, N. Y., the secretary of the association, will be glad to answer any questions concerning the coming convention.

Reunion of Old Timers and Military Telegraphers.

Mr. G. A. Cellar, chairman of the finance committee of the Old Time Telegraphers' and Historical Association, has been elected president of the association by the executive committee to succeed Mr. E. B. Saylor, resigned.

GEORGE A. CELLAR.
The newly-elected President of the Old Time Telegraphers' and Historical Association.

Members of the Old Time Telegraphers' and Historical Association, and of the Society of the United States Military Telegraph Corps are looking forward to their twenty-eighth annual reunion which takes place at the Fort Pitt Hotel, Pittsburg, Pa., August 17, 18 and 19. The finance committee of the Old Timers, which is in charge of the arrangements for this reunion, are hoping for a large attendance, and the plans which they are preparing are sufficiently comprehensive and attractive to assure everyone, who contemplates being present at this gathering, a most enjoyable time. Theodore E. Moreland of Pittsburg is chairman of the reception committee of the Military Telegraphers. Any inquiries concerning the reunion will be answered by F. J. Scherrer, of 195 Broadway, N. Y., secretary of the Old Time Telegraphers' and Historical Association, or by David Homer Bates, 658 Broadway, New York, secretary of the Society of the United States Military Telegaph Corps.

The article upon preserving telegraph poles in Europe, appearing in the May 16 issue of Telegraph Age, in which it was stated that the known average life of impregnated poles in Bavaria was seventeen and one-half years and in Germany sixteen years, has brought out the interesting fact that the life of untreated cedar poles in this country averages twenty-two years, while that of chestnut poles averages sixteen years.

Telegraph Age is the leading journal of its class in the world, and should be in the hands of every progressive operator; $2 a year.

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Radio-Telegraphy.

The steamer Corwin, the first vessel to reach Nome, Alaska, each year since 1901, left Seattle for that port on May 10, equipped with a United Wireless Telegraph Company's outfit.

The Japanese steamer Tenyo Maru recently maintained communication with Kobe, Japan, when 1,350 miles' distant. The Telefunken system is installed on this steamer.

The wireless stations of the Boston Herald and the Buffalo News have recently been equipped with apparatus manufactured by the United Wireless Telegraph Company.

Wireless messages can now be sent from Genoa to a distance of 320 miles direct, and the office is in touch with the Italian stations at Rome, Naples, Palermo, Bari, Anconza and Venice.

The French government has awarded a first-class life-savers' medal to John R. Binns for courage displayed when the White Star line steamer Republic was run into and sunk by the steamship Florida off Nantucket last January.

Wireless telegraph stations will soon be installed at Susitna and Seward, Alaska, thus adding two more links in the chain which now establishes communication between the remoter points of Alaska and the outside world.

Mr. A. H. Morse, formerly superintendent of the wireless telegraph system at Montreal, Que., and for the past two years in the wireless service in British Columbia, is now located in the construction department of the United Wireless Telegraph Company, at Seattle, Wash.

Raymond J. Caldwell, aged fifteen years, is said to be the youngest wireless operator who ever worked a wireless installation at sea. During a recent trip of the Mallory liner Nueces from Tampa, Florida, to New York, the regular operator being taken sick, young Caldwell officiated at the key.

The Ohio State University, at Columbus, Ohio, will, during the next college year, institute a course in wireless telegraph engineering. A complete wireless equipment will be installed capable of communicating with the wireless stations at Cleveland, Detroit and other points.

A society representing wireless telegraph engineers has been formed in New York under the name of "The Wireless Institute." Regular meetings will be held in the Engineering Societies Building, 29 West Thirty-ninth street. The president is Mr. Robert H. Marriott.

A patent, No. 921,014, for a hydro-condenser, has been issued to H. Shoemaker, of Jersey City, N. J. Includes a tank, a plurality of condenser units in the tank, each having a jar of dielectric material with conducting liquid in the jar forming a condenser armature and conducting liquid in the tank contacting with the outer sides of the jar to form the second armature.

A patent, No. 921,013, for a transmitting apparatus, has been granted to H. Shoemaker, of Jersey City, N. J. A high-frequency transmitter in which the discharge gap consists of two separated conductors immersed in a liquid, which liquid is common to the circuit including the prime source of energy to a high-frequency circuit.

A patent, No. 921,075, for a mast for space or wireless telegraphy, has been taken out by Alexander E. Brown, of Cleveland, O. Describes a method of building up an insulating portion or section of a supporting base for a mast for space or wireless telegraphy.

A patent, No. 921,293, for a transmitting apparatus, has been awarded to H. Shoemaker, of Jersey City, N. J. For wireless telegraphy in which a closed oscillation circuit contains a plurality of condensers in series with each other and with inductance, together with a direct connection from the charging source to the terminals of less than the whole number of condensers.

A patent, No. 921,531, for a receiver for electromagnetic waves, has been secured by R. A. Fessenden, of Washington, D. C. Utilizes the variation in pressure between an electrolyte and an electrode in contact therewith by the flow of electric oscillations therethrough, the resulting motion giving a signal.

To secure eligibles for a position as an electrical expert in the Bureau of Equipment of the Navy Department at Washington, D. C., the United States Civil Service Commission has announced a special examination to be held on June 9. The position now vacant will pay a salary of $5,000 and those who take this examination will be eligible for appointment as other openings occur.

The examination covers a wide technical ground. Candidates will be examined in general technical subjects, in special experience with wireless telegraphy and telephony and original research. The duties of the position will be to have charge of the laboratory which tests instruments pertaining to wireless telegraphy, and develops special methods of wireless signaling.

Lieutenant Jeunet, of the United States Signal Service employed in installing wireless telegraph stations in Alaska, has proven by experiments in that northern country that the power required to transmit messages 125 to 150 miles is three kilowatts; 150 to 200 miles, five kilowatts; 200 to 400 miles, ten kilowatts; 400 to 700 miles, twenty kilowatts. The longest distance between any two stations is 781 miles, from Nome to Fort Egbert. Messages have been clearly transmitted between these stations. The five stations installed or completed by Lieutenant Jeunet during the summer, after being put in full working order, cost the government a total of $113,079. From a commercial standpoint the stations are doing better than expected, and the fact that service is never interrupted makes the wireless telegraph an important factor in the development of the north.

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A patent has recently been granted to F. van der Wonde, of Berlin, in which a system of duplex wireless telegraphy is described. The apparatus used consists of a shaft which carries a series of conducting arms. These are arranged to engage intermittently with a number of stationary contacts. When this shaft is rotated the following cycle of operations takes place: (a) the transmitter is connected; (b) the aerial is earthed; (c) the transmitter is disconnected; (d) the receiver is connected; (e) the earth connection is interrupted; and (f) the receiver is disconnected. If the shaft is rotated so rapidly that during the time of a "dot" one or more revolutions take place, two stations provided with this apparatus can transmit and receive simultaneously.

The acting president of the board of communications of China has sent an order to the telegraph administration in Shanghai directing it to obtain from foreign firms tenders for wireless telegraphic installations which the government desires to establish between the Altai Mountains and Ahsien in the northwest of Chinese Turkestan. The question of a wireless telegraph installation in the interior was pointed out by the administration as one of the most important needs of China to-day. It is said the board considers it practically impossible to establish the ordinary land lines across the great deserts between Peking and the extreme northwest, but the natural difficulties could be surmounted by the use of wireless.

A New Form of Wireless.

The telegraph and telephone companies are in serious danger of being "put out of business" for want of patronage if Professor Edward B. Warman is successful in securing the general adoption of his practice of mental telegraphy. It is a system of "wireless" telegraphy that he recommends and if successful, as he claims it is, the transmission of messages to the most distant points may be accomplished absolutely without expense. And the most convenient and distinctive possibility offered by the Warman telegraph is that the exact location of the receiving person need not be known for the impression of the subconscious mind influences the senses of the receiver wherever on earth he may be at the time. And the effect is instantaneous.

This is the substance of lectures delivered by Professor Warman before large audiences in the Western States.

Press Rates to Glace Bay.

The Times Publishing Company of London, England, on May 16 petitioned the Canadian Board of Railway Commissioners to issue an order directing the Canadian Pacific Railway Company's telegraph, the Great North Western Telegraph Company of Canada, and the Western Union Telegraph Company, to 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. The application stated that while the usual rate on press messages from Ottawa to Canadian Atlantic Coast points is thirty-five cents per hundred words for night messages and fifty cents per hundred words for day messages, the companies mentioned charge private message rates on all press messages to Glace Bay intended for transmission by Marconi wireless. That the charges so exacted are excessive and discriminatory. That the action of these companies in so discriminating in their charges not only works an injury to the applicants and other newspaper publishers, but it also defeats in a way the object the Government of Canada had in view in lending financial assistance towards establishing the Marconi wireless at Glace Bay. On the other hand it was stated that it would be absurd to expect the telegraph companies on this side of the Atlantic to place their thousands of offices and the vast collecting agencies which their systems afford, at the disposal of the wireless companies for the purpose of competing with them in their own field on equal terms, yet this is precisely what the London Times requested the Canadian Government to order. The railroad commissioners after hearing the arguments on both sides decided against the petitioners.

Western Union Telephone Case.

With respect to the published statement that the Western Union Telegraph Company has won a $6,000,000 decision in its case against the American Bell Telephone Company for an accounting, it is stated that Everett W. Burdett, master in the case, has submitted to counsel a draft report of his findings and upon the several questions which have arisen in the course of the hearings before him. This draft report is submitted to counsel with the view to obtaining suggestions and requests for such changes as they claim they are entitled to.

The report does not, in its present form, attempt to state the account, but simply outlines the principle by which the master expects to be guided in stating the account in figures. The master has followed the rules laid down for him in the Circuit Court of Appeals, but in developing the account has allowed some very substantial deductions claimed by the American Telephone and Telegraph Co.

The whole principle of the accounting as interpreted by the master is disputed by the defendant, and when the accounting has been completed, the defendant will still claim that it has no liability to the plaintiff under the contract.

The present status of the case is that both parties will file suggestions in the light of which the master will, if he shall see fit, revise his report. A formal report will then be filed in the Circuit Court and the parties will then take their exceptions to the report which will be argued before the court itself.

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An Up-to-Date Restaurant and Waiting Room.

The Postal Telegraph-Cable Company has recently established a lunch room and restaurant for its employes on the thirteenth floor of its main office building, 253 Broadway. Adjoining the restaurant are waiting or lounging rooms for male and female employes when not on duty. The engravings herewith presented show portions of these well-equipped apartments. Being located on the next floor above the operating room with which they communicate by means of a stairway,

A CORNER IN THE RESTAURANT.

they are most convenient of access to those for whose use they are designed. The apartments are large, airy, abundantly lighted by several outside windows and numerous well-located electric

LUNCH COUNTER.

lights. The furnishings, as shown in the pictures, are of mission oak, and these, together with the handsome decorations furnish a pleasing and cheerful interior, and the Postal employes may well be proud of the place which has been furnished to them in which to spend their leisure moments.

There are accommodations in the restaurant for sixty persons at a time, and meals are served from seven o'clock in the morning until eleven o'clock at night. A well-diversified bill of fare is maintained and the menu presented is sufficiently tempting to satisfy all reasonable requirements, at a charge which cannot be considered as at all excessive. The model kitchen which is fitted out with all of the most modern cooking ap-

LADIES' RESTING ROOM.

pliances is under the efficient supervision of Mr. T. J. Howlett, who had eight years' experience in charge of similar accommodations with this company in Chicago. President Clarence H. Mackay

MEN'S READING ROOM.

is a stanch believer in making those identified with the service as comfortable as possible by furnishing them with cheerful and home-like quarters in which to spend their idle moments, and he is supported in his praiseworthy endeavors by the other officials of the company, particularly Edward J. Nally, vice-president and general manager, who for many years past has urged the necessity of furnishing the large city offices such accommodations as to make employes comfortable and satisfied, including in some instances libraries of books of an interesting and educational character.

There is much for telegraph operators to learn respecting their calling which can be readily obtained by reading Telegraph Age—$2 a year.

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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.

A considerable sum of money has been voted by the British Parliament in recent years in connection with the provision of underground cables for long-distance telegraph circuits, and I have thought that a short account of the underground cable scheme which the British Telegraph Administration is carrying out might be of interest to our colleagues attending the Engineering Conference at Budapest.

The first experiments with underground conductors carried out in Great Britain appear to have been made as long ago as 1816 by Sir Francis Ronalds in his garden at Hammersmith, but it was not until 1837 that subterranean wires were first utilized in London in connection with the commercial telegraph system of the country. In that year five copper wires, covered with cotton and afterwards coated with a preparation of resin, were buried between Euston Station and Camden Town—a distance of 1.2 kilometres. A 5-needle instrument was used at this time, and consequently five wires were required to provide a single circuit. These wires were placed in grooves cut in pieces of timber, with a tongue of wood fitted over them to secure them, and it is not surprising that this experiment did not prove a success.

In the years which followed endeavors were made to produce insulated conductors suitable for subterranean work, and various descriptions of insulated conductors were laid underground in short sections in and near London. The experience thus gained and the progress made in the manufacture of insulated wire encouraged the Submarine and European Telegraph Company to lay six gutta-percha covered wires from London to Dover, through Chatham and Canterbury, a distance of approximately 116 kilometres, the line being completed November 1, 1852. In the following year the Electric Telegraph Company put down a line of eight underground wires on the London and North Western Railway from London to Manchester, a distance of 294 kilometres, and the British Telegraph Company commenced to bury six gutta-percha covered wires along high roads from London to Liverpool via Birmingham and Manchester, a distance of 370 kilometres, the wires to Liverpool being brought into use in 1854 and those to Manchester a year earlier.

This underground system was also extended to Scotland by means of a line of 10 wires in troughs laid as far as Glasgow, and in Ireland, Belfast and Dublin, the two principal towns, were similarly linked together.

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

Unfortunately, all the underground wires laid from London to the provinces failed, and were in consequence condemned in 1857-8, after a very short life. These failures appear to have put a considerable check on the development of long-distance underground circuits in our country, and the matter does not appear to have been taken up again until 1870, in which year an underground line was provided between Liverpool and Manchester, a distance of 57 kilometres.

In 1870 the British Telegraph System was acquired by the State. From an early date of State ownership the serious inconveniences arising from the interruptions caused to the telegraphic service by the storms which periodically visit our shores was forced on the attention of the Telegraph Administration, but it was not found possible to undertake the provision of long-distance underground lines out of the moneys voted annually for the telegraph services, as the demand for the general extension of the telegraph system was being much pressed for by the public at that time.

On the occurrence of each serious interruption caused by storms the public press directed attention to the loss occasioned and inconvenience suffered by the public during the dislocation of the telegraphic communications, and urged the provision of underground cables in order to reduce as far as possible such disorganization and delay. An exceptionally severe snowstorm visited the British Isles in October, 1881, and caused an almost total suspension of the telegraphic service, and in consequence the Postmaster-General called for a scheme for the provision of a fairly extensive underground telegraph system.

A scheme was prepared by the Engineer-in-Chief of the Post Office in 1881, involving cables from London to Penzance, in Cornwall, a distance of 510 kilometres; London to Aberdeen, in Scotland, a distance of 803 kilometres, and also providing connecting links between the important centers of Ireland. The number of conductors which it was proposed should be provided in each section is shown on the accompanying map, Figure 1. This scheme involved the provision of 65,000 kilometres of subterranean wire at an estimated cost of £1,720,320. After careful consideration, the Postmaster-General decided that so large an expenditure could not be incurred on the telegraph system at that time, and the question remained in abeyance until 1887. In the latter year another severe storm swept over the country, and caused such serious dislocation of telegraphic traffic that the Associated Chambers of Commerce made urgent representations to the Postmaster-General, who again caused the question of the provision of underground conductors to be referred to the Engineer-in-Chief.

Since the first scheme was drawn up fresh developments had been taking place, and new factors were introduced into the problem. The number of wires to be carried on aerial routes out of London and other large cities had increased to

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such an extent that it became evident that it was no longer possible to provide a sufficient number of pole lines in the localities referred to, to meet the growth of wires occasioned by the ordinary increase of traffic. The change of policy inaugurated by the introduction of the new rate of sixpence for 12 words on inland telegrams on October, 1885, further increased the difficulties in connection with provision of open routes for the additional channels required. The seriousness of

FIGURE I

the situation can be understood when the fact is stated that the introduction of the lower tariff increased the number of messages handled from 33,000,000, in the financial year 1884-5, to 50,000,000 in the following year.

The foregoing factors were taken into consideration in connection with the proposals put forward in 1887, and provision was made for an increase in the number of telegraph circuits between important towns proposed in the 1881 scheme. In consequence, the new scheme involved the provision of 101,500 kilometres of underground wire at an estimated cost of £2,480,000. It was again considered that the expenditure of so large a sum of money was out of the question, and no action was taken.

The growth of the telegraph system continued, and in 1895 the British Post Office purchased the telephone trunk lines of the country, which had been built by private enterprise. The difficulty of providing open routes for the additional telephone trunk circuits required to meet the increasing traffic now began to be acutely felt, and attention was once more drawn to the question of the provision of underground cables for long-distance telegraph circuits. Accordingly, in 1896, the Postmaster-General obtained a grant of £165,000 for the provision of an underground telegraph cable between London and Birmingham, a distance of 188 kilometres. It was decided that the cable for this work should be of the paper-insulated lead-sheathed type, a type which had not up to that time been much used in this country.

In the years which have followed since 1896 further grants have been obtained from Parliament, and in consequence many important centers in Great Britain have already been connected by means of underground telegraph circuits, provided wholly in lead-sheathed cables.

The construction of telegraph works on public highways is, in our country, regulated by various Acts of Parliament, which lay down the procedure to be followed in dealing with the local authorities responsible for the maintenance of these highways. These acts also legislate for the manner in which cases in dispute, between the Postmaster General and the local authorities, shall be tried in the event of a failure on the part of the two parties to come to an amicable understanding. Briefly, the telegraph acts provide that, in respect to roads situated in urban areas, the permission of the local authority shall be obtained to lay the pipes, which it is required to use, in positions to be agreed upon, but in respect to roads situated in rural districts such permission is not necessary. In the latter case the Postmaster-General is required to serve a notice of his intention to lay pipes, etc., but before any work can be commenced it is necessary to come to an agreement with the local authority as to the depth, course, and position of the pipes and cables to be buried. It naturally follows that at times, before the exact route and particulars of a telegraph line can be determined, negotiations have to take place with the local authorities, as the proposals of the telegraph engineers are not always acceptable, and the local authorities occasionally attempt to impose conditions in connection with the execution of the work to which the Postmaster-General cannot agree. For instance, the local authorities at times desire a longer route to be adopted than the one proposed, and sometimes request that the pipes shall be buried at a greater depth than that desired by the telegraph engineers. Further, it is not unusual for onerous conditions to be proposed in connection with the restoration of the road surface, and when the local authority undertakes to make good the surface of the road by its own workmen, it is sometimes necessary to challenge

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the prices which it is proposed to charge for such work. These matters frequently involve a considerable amount of correspondence and delay. Sometimes it becomes necessary to decide that the works shall be commenced before all particulars concerning the whole route have been settled, and in such cases a gap, which has to be bridged at a later period, is left in the disputed section. Difficulties of this kind had to be overcome in connection with the works dealt with in this paper, but as they have only a local importance, I do not propose to make any further reference to the matter.

After the details in connection with the exact route to be followed, have been settled as far as practicable by the engineers with the local authorities, schedules giving particulars of the route, mileage of each kind of road surface under which pipes will be buried, etc., are prepared, and submitted to the Engineer-in-Chief.

All large works in connection with pipe laying, are carried out for the British Post Office by contractors. The contractors excavate the trenches, joint and lay the pipes, fill in the trenches, and are required to make good the surface of the metalled or paved roadways and footpaths in those cases where the local authority does not elect to act as contractor to the Post Office for such work. For the purpose of inviting tenders it has been found convenient to divide the route to be followed by the pipes, into sections each about sixteen kilometres long, the boundaries of towns and villages being adopted as suitable dividing points. Invitations to tender are issued to selected contractors only, who are furnished with the particulars contained in the schedules compiled by the engineers, in order to assist them in quoting prices for excavations in different kinds of soil, and for the restoration of the various descriptions of road surface, etc. A contractor may, of course, tender for and obtain the contract for one or more of the sixteen-kilometre sections of pipe track. The contractors, whose tenders are accepted, have to undertake the responsibility for the maintenance of the road surface in good order to the satisfaction of the local authority, for six months after the date of the completion of the work. This provision is stipulated in the contract owing to the fact that the telegraph acts have placed this responsibility on the Postmaster-General.

In the case of the underground line between London and Birmingham which was commenced in January, 1897, the contractors were invited to supply as well as to lay the pipes. It was naturally necessary to ensure that the pipes were good, sound, of full gauge, and free from projections on the inner surface; with this object in view they were examined on delivery at the site of the work. This examination had to be carried out very strictly, and much inconvenience was caused by the fact that nearly 30 per cent. of the pipes had to be rejected as unsuitable. Largely owing to this experience, the British Telegraph Administration now purchases all pipes required for underground cables direct from the makers, and employs officers to examine the pipes at the foundries, where those found satisfactory are marked on the flat face of the socket with two arrows, so as to be easily identified. Pipes which are bent to the extent of more than 2.5 centimetres in a length of 2.7 metres or 1.8 centimetres in a length of 1.8 metres are rejected.

Cast-iron pipes having internal diameters of 5 centimetres, 7.5 centimetres and 10 centimetres, have been used in carrying out the scheme represented on the map.

Pipes of the smallest diameter mentioned have been used only on those branch lines where it is known that a comparatively small number of conductors will be required. Pipes having a diameter of 7.5 centimetres were for many years almost exclusively employed on all of our important works, but in connection with the development of the main underground system it has been found advisable to make provision for a certain number of conductors for telephone trunk purposes. In order that the electrostatic capacity of the conductors required for telephone purposes may be kept low without diminishing the number of conductors hitherto provided in main cables, it has recently been decided to use pipes eight centimetres in diameter on the principal long-distance underground routes. Pipes of ten centimetres diameter have been used in a few exceptional cases when very long-distance telephone trunk lines are involved, again with the main object of reducing the electrostatic capacity of the conductors.

(To be continued.)

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, is 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 three months old are regarded as back numbers and cost twenty-five cents per copy.

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JUNE 1, 1909.

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 principal cable codes, will be sent to any one asking for the same.

State Telegraph Legislation.

The officials of the state of Mississippi some two years ago were vehement in their determination to exact all the taxes that foreign corporations, doing business within its borders, could stand. To be sure that no loophole was provided through which the telegraph or telephone companies could escape, a state railroad commission was created, with powers to enforce the observance of certain laws and, among other things, the regulation of the telegraph service throughout the state. Among the laws formulated was one compelling the telegraph companies to file with the Railroad Commission quarterly statements of their business transacted in the state, so that the members of the commission might have the facts and figures before them in their regulation of the telegraphs within that state. We are advised by one of the Mississippi authorities that this program of procedure has opened the eyes of the officials of that state and has caused them to wonder why the telegraph is not patronized to the extent that they had been taught to believe in past years by those who were clamoring to curb the progress and development of this important industry.

The Western Union Telegraph Company maintains approximately two hundred and fifty offices in the state of Mississippi and accepts business for over eight hundred places. Here is a statement of the telegraph business transacted within the state by this corporation during the previous quarter: Receipts from local business, $7,896.05; from through business, $33,860.33, making a total business of $41,756.38. The operating expenses were $37,638.86, so that, after paying taxes amounting to $255.96, the net earnings of the company were nearly $4,000 for the quarter.

This report agrees substantially with those filed for previous quarters, and has had the effect of convincing the state officials that at least the so-called telegraph monopoly is actually a necessity to the welfare of the state, and the exorbitant profits that the company has been supposed to transfer monthly from that state to the home office are a myth. Some of the state officials now marvel how a company, maintaining as it does, hundreds of telegraph offices for the accommodation of the public at large, can accomplish as much as it does for the welfare of the people on a profit of $4,000 per quarter, or $16,000 per year. It will be well for other states to take notice of the experience of Mississippi before they conclude to further hamper the development of public utilities by adverse legislation.

The Telegraphers' Strike in France.

The strike of the postal-telegraph employes of France, mention of which was made in our May 16 issue, has come to an end, fizzling out from lack of enthusiasm. The strike which occurred in March was inaugurated as a protest against the government's substituting merit for priority as a basis of promotion. The men returned to work supposing that they had gained a victory. Later, learning that the government did not propose to change its policy, another strike was declared on May 12. The government assumed a firm attitude when the second movement took place, with the result that the strike was short lived.

The uprising was against the state and not against a corporation, and consequently the movement was revolutionary. These rebellious civil servants of the state acted quite outside of the law. It is true that trades unions have had legal standing in France for a quarter of a century. But this lawful right is confined to persons engaged in competitive industries only. Those engaged in government-owned monopolies have no such right, and the authorities may forbid or suppress their illicit associations. To recognize rebellious unionism among its own employes would be a degradation of representative government. Free institutions cannot be intimidated and remain free. The authority of government must be final or there is no government.

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If the postal and telegraph clerks have grievances they must take them to the Chamber of Deputies for settlement. The terms of their service are regulated by national law, and the attempt to alter them by violence is revolution.

The government has discharged several hundred of the leaders, who are permanently barred from re-employment in the government service.

Time of Filing Messages in Massachusetts.

The bill compelling telegraph companies doing business in the state of Massachusetts to record the time of filing on despatches is now a law. The Springfield Republican, in commenting upon the passage of this measure, says:

"Long-drawn-out legislative sessions are naturally productive of many very petty statutes. Distinctively of this class is the bill requiring telegraph companies to mark upon their telegrams the time of filing. Governor Draper allowed it to become a law without his signature. It was not of consequence enough to be worth xetoing, if bojectionable, and so it was not worth the trouble of signing, if unobjectionable.

Andrew Carnegie and the U. S. M. Telegraph Corps.

Mr. David Homer Bates has an article in the May 8 issue of Harper's Weekly entitled, "For Old Times' Sake," which is in a sense an answer to certain criticisms concerning Andrew Carnegie's benefactions, which it has been asserted by certain people, are bestowed chiefly for the sake of notoriety. Mr. Bates enumerates hundreds of cases of pensions granted in a general way by Mr. Carnegie, of which he himself does not know, as his method of procedure in such instances is merely to direct Mr. R. A. Franks, president of the Home Trust Company, Hoboken, to honor applications for pensions, etc., when indorsed by certain individuals. The pensions granted to members of the United States Military Telegraph Corps, of which Mr. Carnegie was the founder, is given as an example of one of his private benefactions, and although up to November 30, 1908, pensions had been granted to sixty-nine of the needy survivors of this corps, Mr. Carnegie himself knows of but a few of those to whom pensions have been granted. Mr. Bates includes in his article the following tribute to the military telegraphers, which is taken from Grant's "Memoirs":

"Nothing could be more complete than the organization and discipline of this body of brave and intelligent men. Insulated wires were wound upon reels, two men and a mule detailed to each reel. The pack-saddle was provided with a rack like a sawbuck, placed crosswise so that the reel would revolve freely; there was a wagon provided with a telegraph operator, battery, and instruments for each division, corps, and army, and for my headquarters. Wagons were also loaded with light poles supplied with an iron spike at each end to hold the wires up. The moment troops were in position to go into camp, the men would put up their wires. Thus in a few minutes longer time than it took a mule to walk the length of its coil telegraphic communication would be effected between all the headquarters of the army."

"President Lincoln," says Mr. Bates, "commended the work of the corps on many occasions and frequently called upon Major Thomas Thompson Eckert, our chief, for important services of a confidential nature, the performance of which he was not willing to entrust to army officers in the field."

The Newspaper as an Educator.

In a recent lecture before the students of Columbia University upon "The Ethics of Journalism," Mr. Melville E. Stone, general manager of The Associated Press, said:

"The newspaper is the chief educational factor in the United States. I do not say that it is the best educational factor, but more people in the United States get their education from the newspapers than from any other source. A free and self-governing people presupposes a free press, and in our country there is a daily newspaper for every three persons over ten years of age.

"The editor is bound to publish that only which in good conscience the public ought to know. It should be his object to publish the truth and such of the truth as is of value to his readers."

Another rule of Mr. Stone's was that an editor should have neither friends nor enemies, and that he should not allow his own opinions to interfere with his journalistic work.

United States Military Telegraph Corps.

We are informed by the secretary, Mr. David Homer Bates, that the executive commmittee of the Society of the United States Military Telegraph Corps has approved the design for a society button to be worn by the members in the left-hand lapel of the coat.

A supply of these buttons will be ready for delivery about June 1. They will cost twenty-five cents each, and applications for the same should be sent to Mr. Bates at 658 Broadway, New York.

Mrs. Mary E. Smith Buell, of Norwich, N. Y., aged seventy-eight years, has recently been admitted to membership in the society. Mrs. Buell, as Miss Smith, was a member of the military telegraph corps and has received her certificate of honorable service under the act of Congress of January 26, 1897. The only other woman member of the corps, so far as known, was Mrs. L. E. Macklind, who died about four years ago.

The practical side of the telegraph is discussed in every issue of Telegraph Age in a manner to interest and aid every individual operator in the service. Why not secure the benefits of such information by subscribing for the paper—$2 a year.

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The Military Telegrapher in the Civil War.

PART XX.

C. W. Pearson, though only a lad of fifteen years of age, left his home at New York and entered the military telegraph service in 1863. From then until the close of the war he rendered valiant service for his country and suffered imprisonment in one of the Southern prisons. He remained in the South until 1869, but since that time has resided in New York, where he is living at the present time, and is employed by the Postal Telegraph-Cable Company in one of its uptown offices. In 1878, in writing to Colonel William R. Plum, historian of the United States Military Telegraph Corps, he gave the following vivid and interesting account of his experiences in the military service:

"I entered the United States Military Telegraph service at the age of fifteen years in November, 1863, going from New York to Cairo, Ill. My stay at this place was brief and devoid of interest. I was ordered from Cairo to Memphis, and being young and a stranger, after landing from the steamer "Glasgow," I strolled down the river bank to take a look at the place, and in some unaccountable way got inside of Fort Pickering. Getting in was all right, but when I went to pass out I was immediately arrested and taken to the commanding officer, Colonel Ziegler. I was so confused that I could give no account of myself, but just as I was being marched off to the guard house I remembered that I had a letter to Captain Fuller, also one from a friend at home in New York to his brother, an officer in Fort Pickering, which letter I presented to the Colonel who sent me under guard to said officer, who received me kindly, and I was released. It being Sunday I remained with the officer until Monday morning, and then reported to Captain Fuller, at General Hurlburt's headquarters, who immediately assigned me to duty at General Webster's headquarters, located at the Memphis and Charleston depot. Captain Fuller being military superintendent, I was taken care of in Memphis by L. B. Spellman and W. B. Summerville, both of whom had been in the military service some time. I being the youngest operator in the department was often sent out on the Memphis and Charleston Railroad to different stations, Moscow, Lafayette, Colliersville, etc.

"In October, 1863, I was ordered with R. B. Griffen to proceed to Columbus, Ky., to relieve Jacob Volney Hill and William Gibson. (Hill was afterwards buried at Columbus, he having died of small-pox.) Everything was quiet at this post until March 21, when we received news of Forrest's advance upon Union City, Tenn., and I was ordered to report to General Brayman and proceed by train to Union City with two regiments of infantry and one battery loaded upon flat cars. Our lines being cut we did not know as we proceeded at what moment we would be fired upon by Forrest's cavalry. Before reaching Union City we were met by some negroes who came out of the woods and reported that Colonel Hawkins had surrendered to Forrest. Our operator, E. B. McNairn, was captured at this place, but escaped from Andersonville prison several months afterwards. General Brayman knowing that Forrest would head towards Paducah, concluded to return to Columbus, and take his command to that place. Forrest, however, reached there first, but did not find Paducah so easy to capture as Union City, although our force was much less, and after a hard fight from daybreak to dusk he was compelled to withdraw after suffering a heavy loss. Our loss was but forty-nine killed and wounded, our men being protected behind a mud fort on the river bank.

"After the fight I was placed in charge of the Paducah office, relieving Edwin Peel, who went home to Canada, but who afterwards returned to the Army of the Cumberland. Paducah at this time was considered the best military office in the department, as a large commercial business was transacted there. There being so many older and deserving operators in the command I was relieved by Peter Fowler in July, after a stay at this point of nearly four months, and reported back to R. B. Griffen at Columbus, Ky. I had been there but two weeks when I received instructions to proceed to Memphis, and accompany Captain Fuller to New Orleans. I took the first steamer, and upon arriving at Memphis I met the Captain, who had held the steamer Olive Branch two hours for me, and not until I arrived did he find out that he had forgotten my transportation and sent me to procure it.

"When I returned to the wharf I could just see the Olive Branch rounding the bend south of Memphis, so I reported back to R. S. Fowler, assistant superintendent, who immediately assigned me to duty at General C. C. Washburn's headquarters, where I remained until August 21, when I was captured by Forrest during his raid upon that city. It was Sunday morning about four o'clock. I had fallen asleep when I was awakened by heavy firing. Looking out on Union Street, I saw a large force of cavalry, but supposing it was some of our own men, I did not pay any attention to them until the Judge Advocate came running through the hall, and as he went upstairs told me they were Rebels. I thought they would fire the building, so I went for the back stoop and jumped off, never thinking how far it was to the hard pavement below—though by actual measurement it was eighteen feet. I landed on my feet, however, and had no more than reached the pavement when I was commanded to halt, but had no time just then. I turned and ran through the lower hall only to find it full of Rebels, so I had to surrender, and as Forrest was in a greater

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hurry to get out of the city than he had been to get in the prisoners were hurried away at a brisk run.

"After we were about five miles outside of the city I asked to be allowed to see General Forrest, and to my surprise he was pointed out to me by one of the Rebels as a man lying beside the fence on a rubber poncho. Upon explaining to him my situation, he immediately commenced to question me as to where A. J. Smith's forces were heading for, but although I knew considerable about his movements I evaded the questions when he became vexed and told me I was not telling him the truth, and that he would not do anything for me until I did so. The consequence was I was sent South with the rest of the prisoners. We were marched seventy-five miles to Tupelo, Miss., in two days, and then allowed to sleep all night in the mud, as it had been raining continually since we started. That was, however, the soundest and sweetest sleep I ever enjoyed. I might add that the Rebels took all of my clothing except my undershirt and pants. When we were loaded into freight cars next morning to go South one of the Rebels came into the car with an old pair of pants large enough for Barnum's giant, and told me to haul mine off and put them on. One of the boys spoke up and said, 'Let him keep his pants, that is all he has left of the blue.' He replied, 'Can't do it, his skin is blue, that will do for him.'

"We went from Tupelo to Grenada, then to Canton, Jackson, Duvall's Bluff, Ala., Selma, and from there to Cohaba, where I remained about thirty days, when I was exchanged, as an order came to exchange all men captured at General C. C. Washburn's headquarters. I found that my chances to be exchanged as an operator were bad, so before going into Cohaba prison I gave my name as belonging to Company M, Second Illinois Cavalry, and was exchanged as such. Our food in prison consisted of coarse corn meal and salt pork of a very inferior quality. I never saw a blanket among the 2,500 men confined to Cohaba. Our prison consisted of an old cotton shed from which they had taken the roof, so we had to lie down in the sand and look to the blue sky; if it rained we had to take it. I saw many strong men lie down and die from exposure, and I myself came near being shot twice. There was an outside yard where we did our cooking. We could pass out to this yard, but must not stop within a circle which was called the dead line. I was passing out one morning when some one within called me. I turned round to see what was wanted when one of the prisoners in the outside yard said, 'For God's sake Pearson, get out of that.' I jumped just as the guard fired, and what was intended for me killed a young man about my age. I shall never forget it if I should live to be a thousand years old. I asked permission to keep the flies off of the dying man, and as they carried him out, he said, 'Boys, if you ever capture a Rebel, remember me,' and died on the rude stretcher before they were outside the gate.

"Another time I was not doing just as they thought I ought and they made me mark time in the broiling sun and burning sand until my feet were a complete mass of blisters. So you can imagine it was a happy day when all the prisoners captured at General C. C. Washburn's headquarters were called out to be exchanged. There were seventy-six of us all told. When I reached Memphis I slipped out of the ranks, I was so afraid they would find out I had changed my calling from an operator to a cavalry man and send me back to exchange another in my place. I went up into headquarters and found my old friend Edward Butler, who had taken Fowler's place, but he did not recognize me, tired and dirty with nothing on but an old shirt and pants and they creeping off me with vermin. When I made myself known to him he took me over to 'H' office, where he burned my clothing or rags and put on clean ones as my trunk was still there. All the boys got up out of bed, as it was then ten p. m., and we went around to a restaurant and got a square meal, and I tell you it tasted good. After I had recruited my strength which took some time as I was reduced from 140 to 110 pounds, I obtained a furlough for thirty days and went home to New York to see my parents.

"I returned to Memphis in January, 1865, and upon landing, saw my friend, S. L. Robinson, at the present writing manager of the Board of Trade, Chicago, sitting on the hurricane deck of a steamer bound north, and nursing about twenty buckshot wounds, which he received while out on a raid with General Grierson. I stayed in Memphis two months, and then proceeded to New Orleans, and reported to Captain Fuller. I remained there but three weeks, when in company with S. L. Robinson I was ordered to Fort Gaines at the mouth of Mobile Bay. We embarked on the steamer N. P. Banks, but on account of a severe storm on the gulf of Mexico we were driven about forty miles out of our course to Pensacola, Fla.

"The boat finally reached Fort Gaines and we at once went to the telegraph office but the operator on duty said that he could not keep us as he did not get enough to eat himself. We then went across the Bay to Fort Morgan, where Mr. Upton, the genial operator received us kindly and cared for us. It was Captain Fuller's intention to establish a line through to New Orleans by way of Fort Gaines and Fort Morgan, to follow the army to Mobile, but the project had to be abandoned because, as fast as the poles were put in the sand, the heavy winds in that section would blow them down. So our line was but a short one, from Navy Cove, Ala., to Fort Gaines, five miles of land and five of cable. I soon afterwards was put in charge, and Robinson remained with me. We had a splendid time as fishing was good, and oysters plentiful. We were soon rein-

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forced by Charles Smith, Dorsey Berry and John R. Frank, awaiting the advance of the army on Mobile, which took place about the middle of March. Frank, Smith and Robinson were then assigned to duty at or near Spanish Fort, where they run lines from one headquarters to another, using field telegraphs in front of the enemies works where the ground was full of torpedoes which the Rebels had buried.

"After the enemy had surrendered to General Ousterhous we all went into Mobile and opened the office there. After things were running smoothly in Mobile, Charles Smith was made assistant superintendent, Frank, chief operator, and I was sent to Columbus, Miss., to report to General Grierson as cipher operator, being the only cipher operator at Mobile, except Robinson, who was under orders to proceed to Texas. I stayed at Columbus about two weeks until General Grierson moved. During that time I had caused two Rebel operators at that place to take a stringent oath to support the Constitution of the United States. I then left for Mobile where I stayed with Smith until July, and was then ordered to Vicksburg, Miss., and remained there until November 26, 1865, when I resigned as the lines were about to be turned over to the telegraph companies.

"I remained in the South until 1869, when I returned to New York, where I have been ever since. The government should recognize our services in some way, as a better class of operators I have never seen than those comprising the United States Military Telegraph Corps; they were always ready for duty, unmindful of danger. I would also say that Colonels Fuller, Gross and Van Duzer and Major Smith were all boys among us, all of them beloved by the operators."

Is Wireless Telegraphy Dangerous?

The conduct of wireless telegraphy, according to M. P. Bellile, a French naval surgeon on board the "Descartes," which has been engaged in the campaign in Morocco, is not unaccompanied by risk of injury to the health of those working in the immediate vicinity of a radio-telegraph station. The members of the ship's company who were employed in wireless telegraph duty developed various affections in consequence of the action of the Hertzian waves. Most commonly the telegraphers complained of their eyes, and cases of slight conjunctivitis, keratitis, and leucoma occurred. In order to protect the eyes from damage by the ultra-violet rays of the electric emanation, which have a very powerful action, it was recommended that yellow or orange glasses should be worn. Not only were the eyes of the operators affected, but two cases of eczema—one of the wrist and one of the eye-lid, both very difficult to cure—were observed, probably due to the same cause. Lastly, one of the officials who had been employed for several years in wireless telegraphy, suffered from painful palpitation of the heart, which came on after working for any length of time at the sending instrument. This man was quite free from any organic lesion of the heart. M. Bellile is disposed to think that a good many of the cases of nervousness and neurasthenia, which now seem to be getting rather common among naval men, may be directly or indirectly due to the work which is being done in connection with wireless telegraphy.

In reply to this statement Mr. Marconi most emphatically asserts that, as the result of his own extensive experience, and that of the companies associated with his name in all parts of the world, there is no evidence whatever in support of the findings of M. Bellile. "Just as it is necessary," he says, "to protect the eyes from any source of intense light, so, in our high-power stations we find it convenient to surround our sparks and discharges with a non-translucent screen or box; but no other precautions have been found necessary, and the health of our operators and other employes has, I am glad to say, been uniformly satisfactory. During the twelve years or so of our operations, we have had to deal with no single case of compensation for any injury of this origin, nor, so far as I can ascertain, has any such injury been suffered. Speaking for myself, I may remark that my own good health has never been better than during the often extended periods when I have been exposed for many hours daily to the conditions now challenged, and in the constant neighborhood of electrical discharges at our transatlantic stations, which, I believe, are the most powerful in the world."

A Useful Device.

No telegrapher who operates a typewriter can afford to be without a Hudson Word Register, which has been placed on the market recently by a manufacturing concern which has the reputation of producing the very best goods obtainable in their line. This useful adjunct to the telegraphers' typewriter is thoroughly accurate and cannot be rendered otherwise except by carelessness or wilful design of the operator. Each point on the dial is numbered so that the operator can read at a glance the number of words written, and having a recording capacity of fifteen hundred words, it can be used for both message and special work. This simple device being made in compact form and carefully finished is an ornament as well as a labor saver and can be supplied with attachment for any standard make of typewriter. The price of this word counter is $5.00 and orders may be sent to J. B. Taltavall, Telegraph Age, 253 Broadway, New York. Orders should state what make of machine it is to be used on as attachments differ.

Mr. H. L. Clark, manager of the Western Union Telegraph Company at Marietta, O., says that Telegraph Age is always a welcome visitor to his office, and he would dislike to miss a copy.

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A Central Battery Duplex System for Long and Short Lines.*

BY C. C. VYLE AND E. V. SMART.

For some considerable time the need has been felt for a Central Battery duplex system suitable for use on lines of from 20 to 150 miles in length. Such lines possess appreciable electrostatic capacity, may terminate in offices where the skill possessed by the operating staff in obtaining resistance and capacity balances is insufficient to insure the best results being obtained, and, like all other lines of such lengths, may be subject to low insulation in wet weather. Many systems have been tried, but that herein described is one of the most efficient yet developed.

Figure 1 illustrates the arrangement:

So far as the central station is concerned it will be observed that a key capable of reversing the

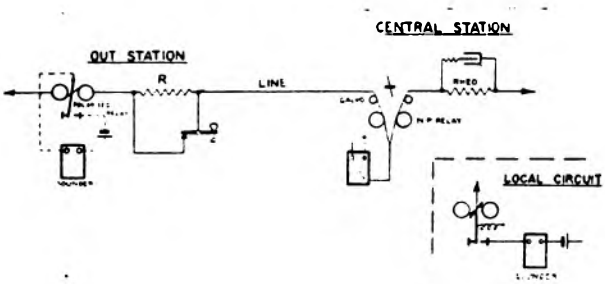

FIGURE 1.

direction of the current is provided, and that the current passes differentially through the coils of a non-polarized relay and a galvanometer respectively in such a way that if the one portion of the current be equal to the other no effect is produced on either instrument.

At the out station the signaling key short-circuits a rheostat R, but on depression of the key the resistance in the rheostat is added to that of the line; a polarized relay with sounder and battery in local circuit, or a polarized sounder alone direct in the line may be provided.

The central station operator first inserts sufficient resistance in the rheostat at that station to insure that the majority, say 75 per cent., of the total current strength shall flow to line. Then the distant station is requested to depress the key and to increase or decrease the resistance in the rheostat at the far end until the galvanometer needle at the central station points to zero, i. e., until a resistance balance is obtained. Next, the central office balances for capacity (the out office key being still depressed), and puts sufficient tension on the relay tongue spring to bring the armature away from the pole pieces and cause the tongue to make decided contact with the stud on the right, thus completing the local circuit and registering a mark. The amount of tension required on the spring to produce good signals is a matter of some importance. In practice it is found best to make it half that required to render the tongue neutral when the out station's key is up; or a mean between that required to render the tongue neutral in the two conditions—(a) distant key down and (b) distant key up.

It will thus be seen that the central office operates the polarized apparatus at the distant station by reversing the current, and that the out office operates the apparatus at the central station by equalizing the strengths of the currents in the coils of the non-polarized relay so as to allow the spring to act and cause the tongue of the relay to complete the local sounder circuit.

The success of the system depends upon the adjustment of the antagonistic spring of the non-polarized relay, which has to be such that the tongue does not move over to the right-hand stud while the central station is sending, but does so when the out station's key is depressed, and the circuit becomes balanced so far as the central station is concerned. Between these two conditions there is a very wide margin.

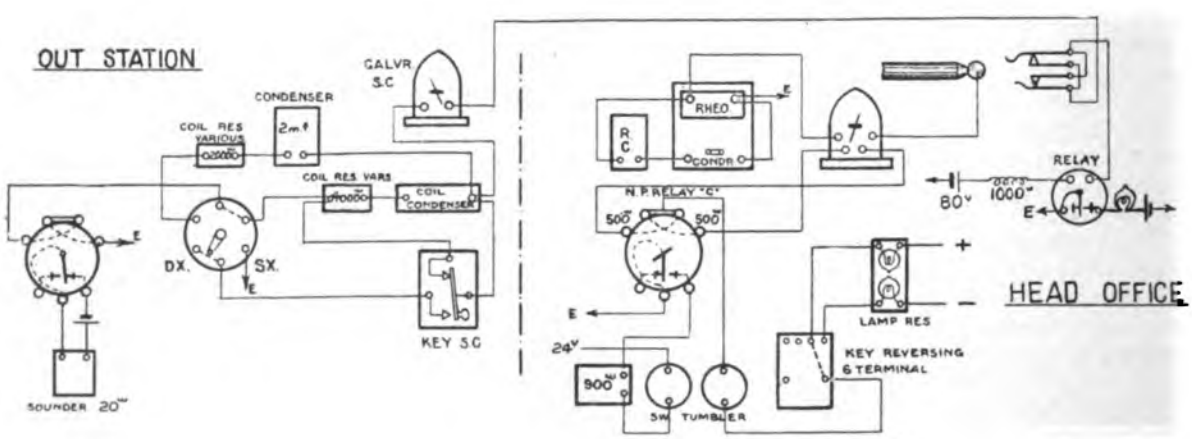

FIGURE 2.

The advantages claimed for the system are:

(1) No batteries are required at the out station if a polarized sounder is used, but on circuits subject to variation due to weather conditions a polarized relay with a local circuit should be used

* Post Office Electrical Engineers' Journal, London, April, 1909.

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so as to insure a constant volume of sound during duplex working.

(2) One office only—the head office—has to balance the circuit. The out station has no balances nor fine adjustments to make; only the resistance in the rheostat at that end is varied by instruction from the head office.

(3) The system is practically independent of leakage. It has worked on a wire of approximately sixty miles in length when the insulation was down to 70,000 ohms per mile. Under these conditions the circuit was worked duplex with Automatic Wheatstone at about eighty words per minute.

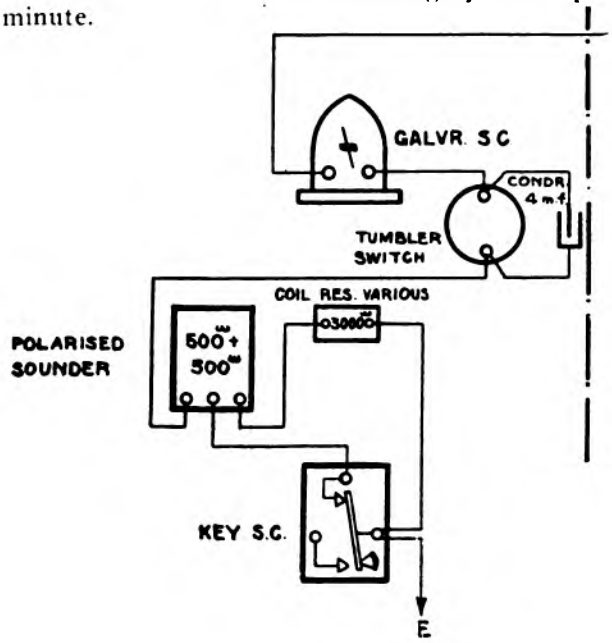

FIGURE 3.

(4) A great saving in apparatus at the out station, and no increase at the head office.

(5) In times of emergency, such as fires or special arrangements, the easy and quick equipment of a set will effect a saving in time and money.

Figure 2 shows a means of providing for concentration at the head office, and for calling the out station by condenser impulses.

Figure 3 indicates the arrangement when a polarized sounder is used at the out station, a course which may be conveniently adopted when the circuit is of moderate length.

Ex-President Roosevelt is not completely removed from civilization as many suppose. If Mr. Roosevelt should desire to send a message he could call up Gondokoro by telephone and put himself in communication with the telegraph system of the world via Khartoum. This is a very different condition of affairs from that prevailing at the time when Dr. Livingston was lost for years in the African jungle. It would be no more than the truth to say that at the present time, it is hard for any man to so hide himself in any part of the world that he cannot make his place and condition known, if he cares to do so.

The Early History of Wireless Telegraphy.*

BY J. E. TAYLOR, A.M.I.E.E.

If an apology is needed for traversing anew the well-worn ground of the history of wireless telegraphy, the excuse that is offered is that, so far as the author is aware, the subject has never been fully treated by any who have been closely associated with the practical development, both of the older electro-magnetic induction systems and the newer radio-telegraphy. Some contributions arising out of much personal experience of both methods of wireless telegraphy may, therefore, not be amiss. The British Post Office can fairly lay claim to have been the home and cradle of practical wireless telegraphy, yet the subject does not appear to have ever been fully presented from the Post Office aspect. Much that has been written, moreover, has been the work either of interested parties exhibiting, consequently, undue bias, or of others who never possessed a working acquaintance with the art. The author has been in direct touch with the practical side of the subject since the year 1895, and had for some years previously closely followed the scientific progress made in Hertzian wave investigations, having specially in view its adaptability to wireless signaling.

Apart from its utilitarian aspect the idea of electrical transmission of signals over a distance without connecting wires has possessed a fascination for the telegraph engineer ever since the early days of the electric telegraph, but no really practical method of doing it was evolved until the Post Office "parallel wire" system was developed. This, of course, is the system which Sir William Preece and Sir John Gavey took an active part in developing. It is so well known that in its main features no description is necessary. With the crude early forms of apparatus used it was found possible to signal over a distance of three and one-half miles in the Bristol channel in the year 1892. With the aid of improvements in the type of shore circuit and apparatus used this range of the system has been extended since 1895, and it has been applied to bridge distances of some seven or eight miles in the Postal Telegraph System of England.

In order to obtain the greatest efficiency from the system the following points should be observed:

(a) The positions of the shore circuits should be selected so that the spread of the electric current in the sea is diverted by the configuration of the coast towards the communicating circuit as much as possible. If at all feasible, the circuits should be arranged to bridge across tongues of land or headlands so disposed that the greater conductivity of the sea will cause the electric current to spread far out. Making connection of

*Post Office Electrical Engineers' Journal, London, April, 1909.

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the circuit into the sea by terminating at both ends in the same bay is to be avoided.

(b) The circuits should not have more than a few ohms resistance if this condition can be achieved at a reasonable outlay in copper.

(c) The receiving telephones should be wound to suit the circuit on which they are used.

(d) The interrupter used for sending should be bridged by a suitable condenser, as not only is destructive "arcing" at the segments avoided or minimized, but the signals are very much intensified thereby.

(e) The circuits should be erected on poles. Experiment shows that underground wires to the two points where the sea is reached are not so effective. No doubt the greater efficiency of the former arrangement is due to the additional mutual induction between the circuits.

(f) The rheotome should be run at a sufficient speed to give from 300 to 500 interruptions per second, and the duration of "make" adjusted to be well in excess of the "break." The human ear is very sensitive to vibrations of about 400 per second, but relatively insensitive to those lower than 300.

For the communication across eight miles of sea between Ballycastle and Rathlin Island, on the north coast of Ireland, a mean transmitted current of about one ampere, involving an expenditure of some 30 or 40 watts from dry cells, will produce good workable signals on the telephone receiver at the communicating station in ordinary circumstances. This installation has been in almost daily use since 1900, and the speed of signaling is only limited by the rate at which the operators can key the messages.

As might be expected, this system is one which lends itself to the transmission of articulate speech. To effect this it is merely necessary to replace the rheotome or current interrupter by a good microphone, preferably of the common battery type, which will make efficient use of a considerable current at 20 or 30 volts E.M.F. Indeed, the only limit beyond that of earth current disturbances, to be presently referred to, to this method of communication is the inability of the microphone to efficiently utilize more than about half an ampere of current. So early as 1894 Sir John Gavey and the late Mr. Matthew Cooper tried this method across Loch Tay, in Scotland, and achieved some measure of success over about a mile of water, but the results were apparently not sufficiently good to warrant the matter being seriously taken up. Improvements in the type of circuit, the windings of the telephone receivers, and the microphone itself, introduced later, put a better complexion on the system, however. Following on some tests carried out by the writer on the Menai Straits, near Carnarvon, in 1900, permission was obtained to try the improved system between the Skerries Lighthouse and Cemlyn, in Anglesey, with promising results. This was promptly followed by its permanent establishment as a means of communication between those places.

The history of the development of the British Post Office "parallel wire" system would be incomplete without some reference to the several attempts which have been made to equip it with a reliable calling device. The absence of some means of calling attention at the stations when a message is to be sent is, of course, a serious weakness, and necessitates a prearranged programme of times at which the operators will be in attendance to exchange signals. This is, at best, a poor alternative to an audible call, such as the ringing of a bell, and curtails the usefulness of the communication very considerably. The addition of such an appliance would, at first sight, appear to warrant little more than ordinary engineering skill; nor is it difficult to introduce apparatus by means of which a bell can be rung, but it is nevertheless a problem of exceptional difficulty to ensure that the bell shall only be rung by the operation of the transmitting station. An occasional false call or two, even, would not altogether destroy the utility of such appliances, but the fact remains that no real success has yet attended the numerous attempts in this direction. One of the earliest of these was made by Mr. Sydney Evershed, who designed an ingenious and highly-sensitive tuned relay, constructed to respond to the transmission of an alternating current of definite frequency. His relay, indeed, closely resembled the modern vibration galvanometers, of which it may be regarded as a forerunner. The marvellous precision with which this instrument could be made to respond to the feeble induction produced by a small bar magnet set in rotation several feet away was extremely striking. Another was designed by Sir Oliver Lodge, and embodied the principles of his magnifying telephone device for relaying and magnifying minute pulsations of current. This also was a highly-tuned appliance, and carried the tuning principle a step further than the Evershed, in that the circuits were made electrically resonant to the proper frequency in addition to the mechanical tuning of the apparatus.

The cause of failure in all cases was the existence of erratic and sometimes powerful earth-current disturbances on the circuits. These earth-currents are of a very variable character, and are often far more powerful than any currents generated in the receiver by the operation of the distant transmitter They are at times so strong as to render the Morse signals in the telephone receiver quite unreadable, and, to whatever cause they may be due, are undoubtedly of the same origin as the well-known atmospheric disturbances which interfere so seriously with the Marconi and similar systems of radio-telegraphy at the present day. There is little doubt that they are closely connected with electrical effects taking place in the atmosphere, probably at a very high altitude, which in turn owe their origin to solar radiation. They produce many characteris-

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tic noises in the telephone receiver, likened to the sound of rushing water, bubbling and crackling noises, with, at night (and on occasions during the day), a weird occasional note between a chirp and a moan of varying intensity, but always having approximately the same duration of some three or four seconds. They form an interesting study, and may be observed in their full intensity on any isolated circuit regularly every evening, commencing about an hour before sundown and extending well into the night. In a communication to the Royal Society on the subject (January, 1902) the writer has suggested a meteoric origin for the chirping sounds, and an "ionization" effect in the atmosphere for most of the other noises in evidence. The latter is also thought to be a predominant cause of the diurnal variations of the earth's magnetic field. In fact, there is little doubt that the daily fluctuations shown by the magnetic needle are very closely connected with earth-current phenomena. The rapid minute changes of potential at the earth-plates, made evident by the telephone, must involve similarly varying electric currents of no mean order in the crust of the earth and in the seas and oceans. These in turn must of necessity produce similar rapidly fluctuating changes in the earth's magnetic field at the surface, to which, however, the magnetic needle is much too sluggish and insensitive to respond . The telephone may thus be said to render evident rapid diurnal variations of the earth's magnetic field which are not shown by the magnetic needle, to which it should prove a valuable supplementary appliance in researches on this interesting and attractive subject.

In the past the pros and cons of induction and conduction theories of the "parallel wire" system have been much discussed, but the writer is not aware that any authentic results of tests bearing on this point have been published. Such tests have, however, been made, and leave little doubt as to the proper explanation of the action taking place. In the year 1900 tests were made on the Menai Straits, near Carnarvon, in which the relative efficiencies of earthed and non-earthed inducing circuits and of earthed circuits of low and high elevation were accurately determined, the distance between the inducting and induced circuits being a little over half a mile across shallow salt water. The principle of measurement consisted in adjusting the strength of currents in each of the inducing systems under test until equality of signals was observed in the receiving circuits. Arrangements for rapidly switching from one system to the other at one or both sides simultaneously, as desired, rendered the method of observation a tolerably accurate one. The efficiencies of the systems could then be stated in terms of the strengths of current used for transmitting. In this way an elevated earthed system was shown to be about eighty times as efficient as a vertical closed circuit with its upper part elevated to the same height as the former and its lower part at sea-level. It was also shown that the elevated earthed circuit was some two or three times as effective as the low- or sea-level earthed circuit. There is little doubt, therefore, that both conduction and induction effects were concerned in the results obtained. Indeed, it is pretty obvious that conduction without induction is hardly possible, for the conduction current must carry its magnetic field with it, and this must produce an E.M.F. in the receiving circuit when stopping and starting. It is not possible to determine accurately the leakage current received when passing a steady current in the transmitting circuit, both by reason of variable polarization of the earth plates and by reason of the presence of variable earth currents which cannot be eliminated or properly allowed for.

There can, however, be no question of the benefit derived from disposing the circuits so as to take the fullest advantage of the configuration of the coast, and so materially aid the conduction by suitably diverting the flow or spread of current. This has been done in the cases of the Ballycastle-Rathlin and the Skerries-Anglesey installations, and is, no doubt, largely accountable for the possibility of signalling with relatively short lengths of line on Rathlin Island and the Skerries respectively, lengths which completely upset the earlier estimates requiring that the line on each coast be not shorter than the actual distance bridged. This point also was investigated in the Carnarvon trials referred to previously, and it was found that very poor results attended any attempt to communicate with circuits located where no assistance, but rather the reverse, was rendered by the configuration of the shores. In this way the name "parallel wire system" is rather a misnomer, the wires being usually anything but parallel.

There is one field of possibly useful application for this method of communication which, so far as the writer is aware, has not yet been touched. It should lend itself to a cheap and easy method of communicating from one point to another on tongues of land where a short length of line suffices to bridge across the tongues at each point. In such cases the distribution of the current-spread should be extremely favorable to the communication, and should, therefore, enable comparatively long distances to be bridged cheaply. Similarly, advantage could be taken for inland communication of neighboring streams or rivers connected by short lines at the points where communication is desired.

However, there is little doubt that, so far as any extensive applications are concerned, such systems have been superseded by their newer rival—the Hertzian system. The inexorable laws of nature step in, decreeing that current-spreading or electro-magnetic induction shall attenuate itself as the third power of the distance or thereabouts, while radiation of waves shall be attenuated as the distance only. Against such a handicap it is useless to do battle, and radio-telegraphy must perforce hold the field.

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An Electric Telegraph Pioneer.

In proportion to the progress or advancement of an applied science or art, interest increases in its origin and originators, and it is for this reason that we lose no opportunity which offers of harking back to the very earliest history of any branch of the electrical industry. In the matter of electrical telegraphy, says "London Electricity," there have been many claimants to priority in the past, and a recent interesting article in "T. P.'s Weekly" is, in consequence, of particular moment, referring, as it does, to a Scottish claim, dating back as far as 1747. It seems that the first steps in the evolution of the electric telegraph were taken in England and France, almost simultaneously, in that year, but its practicability as a means of communication over distances was, without doubt, first suggested in a short article which appeared in the "Scots' Magazine," under the heading, "An Expeditious Method of Conveying Intelligence." The article is dated Renfrew, February 1, 1753, and bears the initials, "C. M.," but it was not until a hundred years later, viz., 1859, that Sir David Brewster, after a great amount of research and correspondence, was able definitely to fix the identity of "C. M." with Dr. Charles Morrison, who emigrated from Scotland to Virginia in the latter half of the eighteenth century.

In the life of Sir David Brewster, published in Edinburgh, in 1869, a résumé of the evidence of identity is given, together with a few glimpses of the man, Charles Morrison, the hitherto unrecognized inventor of the electric telegraph. Morrison was a native of Greenock. He sprang from a family connected with the tobacco trade in Glasgow, while he, himself, after adolescence, resided and practised as a surgeon in Renfrew. It was in the last named that he first transmitted messages along wires by the aid of electricity, but, instead of being hailed as a genius, the country people were so scandalized at his experiments that they dubbed him a wizard, believing that his powers could only have emanated directly from the Prince of Darkness. The feeling against him became so pronounced that he was compelled, for the sake of his own peace of mind, and the development of his invention, to emigrate. Before doing so, however, he sent a letter to Sir Hans Sloane, then President of the Royal Society, who had already encouraged him in his experiments, giving an account of the invention, and, at the same time, promising to publish it to the world. In this letter also he stated that, afraid of being ridiculed by his acquaintances, he would not give his name, but would send his paper to the "Scots' Magazine" with his initials only. The following is a copy of the original communication, and those who are versed in the elements of static electricity will recognize the methods employed by this pioneer of one of our present-day necessities.

"It is well known to all who are conversant with electrical experiments that the electric power may be propagated along a small wire, from one place to another, without being sensibly abated by the length of its progress. Let, then, a set of wires, equal in number to the letters of the alphabet, be extended horizontally between two given places, parallel to one another, and each of them about an inch distant from that next to it. At every twenty yards end let them be fixed in glass, or jeweler's cement, to some firm body, both to prevent them from touching the earth, or any other non-electric, and from breaking by their own gravity. Let the electric gun-barrel be placed at right angles with the extremities of the wires and about an inch below them; also let the wires be fixed on a solid piece of glass, at six inches from the end, and let that part of them which reaches from the glass to the machine have sufficient spring and stiffness to recover its situation after having been brought in contact with the barrel.

"Close by the supporting glass let a ball be suspended from every wire; and about a sixth or an eighth of an inch below the balls, place the letters of the alphabet, marked on bits of paper, or any other substance that may be light enough to rise to the electrified ball, and at the same time let it be so contrived that each of them may resume its proper place when dropped. All things constructed as above, and the minute previously fixed, I begin the conversation with my distant friend in this manner. Having set the electrical machine agoing as in ordinary experiments, suppose I am to pronounce the word sir. With a piece of glass, or any other electric per se, I strike the wire s, so as to bring it in contact with the barrel, then i, then r, all in the same way, and my correspondent, almost in the same instant, observes these several characters rise in order to the electrified balls at his end of the wires. Thus I spell away as long as I think fit, and my correspondent, for the sake of memory, writes the characters as they rise, and may join and read them afterwards as often as he inclines. Upon a signal given, or from choice, I stop the machine, and, taking up the pen in my turn, I write down whatever my friend at the other end strikes out."

Dr. Morrison then goes on to describe how the method of working the apparatus may be modified by the use of bells, thus establishing himself the precursor of present-day methods of telegraphing by sound as with the "sounder" and "Bright's bell." "If anybody should think this way tiresome, let him, instead of the balls, suspend a range of bells from the roof, equal in number to the letters of the alphabet, gradually decreasing in size from the bell a to z; and from the horizontal wires let there be another set, reaching to the several bells—one, viz., from the horizontal wire b to the bell b, etc. Then let him who begins the discourse bring the wires in contact with the barrel as before, and the electrical spark, breaking on bells of different size, will inform his correspondent by the sound what wire

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has been touched. And thus, by some practice, they may come to understand the language of the chimes in whole words, without being put to the trouble of noting down every letter."

That this early experimenter was alive to the problem of insulation of his line wires, and the necessity for the prevention of leakage, may be gauged from the concluding paragraph of his contribution, which runs as follows: "Some may perhaps think that, although the electric fire has not been observed to diminish sensibly in its progress through any length of wire that has been tried hitherto, yet as that has never exceeded some thirty or forty yards, it may be reasonably supposed that in a greater length it would be remarkably diminished, and probably would be entirely drained off in a few miles by the surrounding air. To prevent the objection and save longer argument, lay over the wires from one end to the other with a thin coat of jeweler's cement. This may be done for a trifle of additional expense, and as it is an electric per se, will effectually secure any part of the fire from mixing with the atmosphere." After reading the foregoing, one is prompted to wonder what the shade of Dr. Morrison would think of latter-day evolutions from his humble beginnings in the science of telegraphy, especially the later wireless phase of the industry."

Foreign Wandering Operators.

In a recent letter to the editor of Telegraph Age a South American correspondent of this paper, at present residing in Brazil, has this to say:

"I have read with interest the article by Mr. J. R. Irwin on 'Foreign Wandering Operators,' which appeared in the March 1 issue of your publication. Mr. Irwin concludes a very able and interesting literary effort with the question, 'Does the experience gained pay?' Having had experiences of a similar nature to those recorded by him in different parts of the globe, perhaps you will allow me to say a few words by way of reply to your contributor's query.

"I presume the word 'pay' is used more or less in its financial sense. To telegraphers of an ambitious turn of mind I believe that such wandering, up to a certain point, does pay both from a financial and intellectual standpoint. How many of us are looking forward to old age pensions, very acceptable, as I have no doubt they are? I refer more particularly to the younger generation of telegraphers.

"That we cannot all rise to high and commanding positions in our profession, however much we try, is obvious. It is in this respect that the much travelled and experienced operator, presuming him to be a man of ordinary ability and observation, has the advantage over his more stay-at-home and moss-covered brother who prefers to spend and end his days in the same groove, simply because he knows it means sure bread and butter, and that he may go further and fare worse. Did it ever occur to your contributor to ask himself the question, 'How many men, both in telegraph and commercial circles, owe their ultimate success absolutely to their roving tendencies of bygone days and a resolution, fostered only by ambition, that moss should have no abiding place with them until they had found and established themselves, so to speak?' Presumably not. The Land of the Stars and Stripes alone, I feel sure, could produce quite an army of such persons, including not a few men of affairs and captains of industry, all of whom, I doubt not, look back with feelings tainted neither with remorse nor regret, on their globe-trotting habit. On the other hand, of course there are many cases of dismal failure unrecorded. But I ask, do we not resign our positions with the one object in view, namely, to better ourselves, and by so doing accept a chance?

"Let us not lose sight of the fact, however, that in almost every telegraph service you will find men who are continually bemoaning the fact that they ever left their previous position, which they tell their colleagues was far better than the one under which they are at present suffering untold hardships. They spin glowing yarns as to conditions obtaining in such and such a service in the old days, all of which statements unfortunately are far too often swallowed by the listeners without the proverbial grain of salt. Men of this caliber are detrimental to the welfare of any company, as also to that of the good man when he does come along, and should by no means be looked upon as prototypes of the foreign wandering operator.

"In all of my sojourns I have seldom met a strolling operator who could not produce the very best of references. The fact of his being able to do so is in itself a bulwark against absolute failure. Once started on the move an operator finds it quite against his nature to settle down in any particular spot until he has satisfied himself that he has reached his goal. And who shall say he is not a happy and contented mortal while under the influence of perpetual motion?

"In the present age thirsting after knowledge has become a habit more or less, I think, with most of us. Why? Because knowledge, if applied in the proper manner, pays. To more thoroughly acquire this asset one must necessarily travel. Therefore, I maintain that the foreign wandering operator seldom loses in the end, assuming he has the ability to know when to stop, but rather more often do we find him emerging successfully on top."

We desire to state that back numbers of this paper, those issued more than one month 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.

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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.

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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
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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 Hotel Pontchartrain, Detroit, Mich., June 23, 24, 25, 1909.

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, 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 Association meets in 1909 at Columbus, O., June 15, 16, 17, Great Southern Hotel.

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

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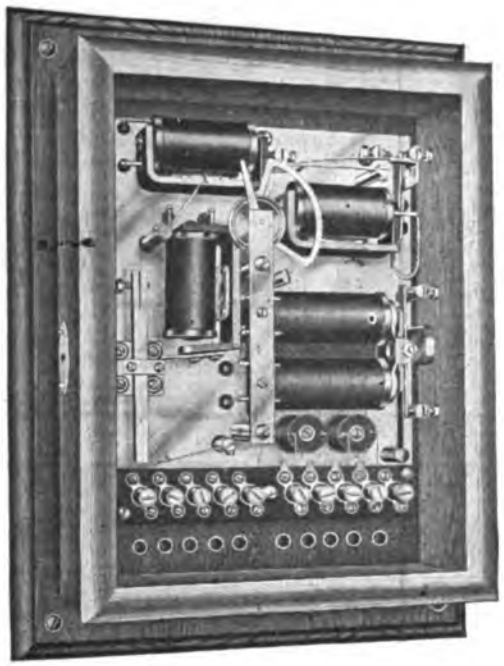
THE SANDWICH SELECTOR



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

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The Railroad.

Benjamin F. Thompson, inspector of telephones of the Baltimore and Ohio Railroad, Baltimore Md., was a recent New York business visitor.

W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., was a recent New York visitor, coming on business connected with the service.

The Erie Railroad, E. P. Griffith superintendent of telegraph, has established a telephone train-despatching circuit on its line between Corry, Pa., and Salamanca, N. Y., a distance of sixty-one miles, single track. The telephone circuits already established by this company have given very satisfactory results.

Mr. E. H. Millington, superintendent of telegraph of the Michigan Central Railroad, Detroit, owing to sickness, has taken a rest of a few weeks at St. Thomas, Ont., but as chairman of the committee of arrangements of the Association of Railway Telegraph Superintendents, he expects to be on hand to greet his associates at the coming convention.

At the spring meeting of the American Railway Association, which was held in New York, May 19, one hundred and fifty-eight delegates were present. The reports of several committees were acted upon, and the following officers were elected: F. A. Delano, president: W. G. Besler, second vice-president, and T. E. Clarke and G. L. Peck, members of the executive committee. The next meeting will be held in Chicago on November 17.

An agreement between the Isthmian Canal Commission and the Panama Railroad Company has been made by which the railroad company will construct, maintain and operate all telegraph and telephone lines and equipment that may be needed in the work of the company and the canal commission. The commission agrees to pay the railroad company $7.50 per month for each telephone instrument, and $2,400 per month for all services rendered by the company in maintaining operators, signal men and other employes made necessary by the operation of the canal commission's trains over the railroad company's tracks. The commission will pay telegraph operators in its own offices as heretofore.

The twenty-eighth annual convention of the Association of Railway Telegraph Superintendents, which meets at the Hotel Ponchartrain, Detroit, on June 23, 24 and 25, promises to be one of the most successful of any ever held by the Association. The committee on topics, of which John L. Davis, of Chicago, is chairman, has arranged an unusually interesting program of papers bearing upon questions of vital interest to every railway telegraph superintendent. The plans prepared by the committee of arrangements, of which E. H. Millington, of Detroit, is chairman, for the reception and entertainment of the guests, are especially attractive, and anyone who contemplates attending this convention may rest assured that his sojourn in Detroit will be pleasantly as well as profitably spent.

The Railway Signal Association will meet on June 8, at the Engineering Societies Building, 29 West 39th Street, New York. At the morning session beginning at ten a. m., after the routine business has been transacted, Mr. C. M. Morrison, Signal Engineer of the New York, New Haven and Hartford Railroad, will present a paper on "The Semaphore Signal Upper Left-Hand Quadrant versus Upper Right-Hand Quadrant." At the afternoon session, Mr. W. K. Howe, chief engineer of the General Railway Signal Company, will present a paper upon "Alternating Current for Railway Signaling."

The Ether and Electricity.

Mr. Henry F. Northcote, in a recent lecture delivered in England on the subject of "Invisible Messengers," said that what was termed the electric current was the throwing of the mysterious medium spoken of as the ether into a state of oscillation, and by this means messages were able to be sent from one side of the Atlantic to the other without any visible action whatever. There were many diverse applications to which electric current could be put. The modern scientist knew nothing absolutely of the nature of this mysterious energy, but all the researches seemed to converge upon one point: that electricity was on some way or other a basic form of existence upon the universe, if not the basic form. They knew that when they had a wire or a suitable path through which the electric current might be made to flow, by actuating the current with a suitable piece of apparatus, they found the path through which the electric current was flowing along in the same way as the flow of water through a pipe, or gas through a gas pipe, but they regarded the conductor as a path along which energy was transmitted. They had come to the conclusion that all through this infinite universe, all other matter of every form, was surrounded by a mysterious all-pervading material—the ether—and this was regarded as the electrical medium. Scientists had, therefore, rather come to the conclusion that the electrical current along a wire, far from being something going through the wire, was transmitted through the ether surrounding the wire, so that the wire simply formed a path.

The diagrams appearing in "Official Diagrams of the Postal Telegraph-Cable Company's Apparatus and Rules Governing the Construction and Repair of Lines" were made from the company's blueprints and are absolutely correct. This volume, which is published by Telegraph Age, under official sanction and supervision, is of especial value to operators and linemen. It will be sent to anyone, postpaid, on receipt of fifty cents. Address J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

The new classified catalogue of books on the telegraph, telephone, wireless telegraphy, electricity, etc., published by TELEGRAPH AGE, may be had for the asking.

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Cross Arms, Painted and Unpainted.

An interesting discussion on the subject of cross arms occurred at the Philadelphia meeting of telegraph, telephone and railway officials interested in improved line construction, which took place under the auspices of the Pennsylvania Railroad Company April 14, and which has been referred to in the two previous issues of this publication. Chairman Spalding, in opening the subject, said:

"In general, there are three types of arms. There is a plain wooden arm, a painted wooden arm, and a creosoted wooden arm. In some cases iron crossarms have been used, but not with much success, but there is quite a difference in the opinions as to the type of crossarm you want to put on—whether you want a plain, a painted or a creosoted arm; and inasmuch as the crossarms are a part of the pole-line construction and constitute a large portion of it, I think some discussion on this point would be of benefit and interest to us all."

J. B. Fisher, superintendent of telegraph of the Pennsylvania Railroad, said in regard to the practice of his company:

"I wish to say that we had adopted a standard of Oregon fir crossarms and used them quite extensively, but two or three years ago, probably two years ago, when the conditions on the railroad were so serious in the matter of car supply and other troublesome features, it was not possible for us to get that material, and we bought a lot of long leaf yellow pine arms. Our forester, who has charge of such matters, thinks we can get a cheaper grade of pine and get good results by creosoting, and he is working along that line, but has not gotten very far."

C. M. Lewis, superintendent of telegraph of the Philadelphia and Reading Railroad, upon being asked why his system used unpainted arms, said:

"The reason we use unpainted arms is this: We used Washington fir for a number of years, and we painted them; they were doing that when I went to Reading. I put up a line shortly afterwards of painted arms, and about two years afterwards we had a storm; this was in 1902. The men came in and told me the arms were rotten. I thought it was impossible, but found that on account of being painted they became rotten. After that I gave orders not to have any more arms painted. I had the same experience on another division, every arm having to be renewed on account of being painted. The arms were on about three years. Since that time we have been using a juniper arm. We had some trouble on the main line where the arms were painted, and we had in some sections for several miles a juniper arm, first cousin to the cedar. These arms were on for twenty years, and I had one of the arms taken off and the paint grained off the arm, and it was just as perfect as the day it was put on. We did not have a rotten arm there, so I thought it was better to use a cedar arm. It is much lighter to handle, and carries the weight all right if you use No. 12 copper wire. If you use No. 6 wire it is different. But for general purposes, we find the juniper arm the best.

"You can buy those arms about fifteen cents cheaper than others. They are very light and easy to handle. They are good arms if thoroughly dried out, but the paint must not be put on until they are thoroughly dried. We have some unpainted arms in the vicinity of Philadelphia which have been up for about ten years and show no deterioration at all. They were put up with the intention of being painted afterwards, but it was not done.

"I cannot say exactly how long we season our juniper arms. That depends on how we receive them. Sometimes they are pretty well dried out when we receive them and sometimes they are pretty wet. The drier they are when received, the less time it takes to get them in condition."

C. H. Bristol, general superintendent of construction of the Western Union Telegraph Company in reply to a question as to whether his company painted their cross arms, said that they did not.

"We learned better," said he, "some years ago, and paid well for our experience. We have some arms that are twenty-nine years old that I know personally are sound; there are some that are twenty-one years old. I know there are some long-leaf pine that have been up for eleven years and still in good condition. All unpainted."

C. A. Lane, superintendent of construction of the Postal Telegraph-Cable Company, said:

"I have a sample arm after twenty-five years, and it shows no rot and is good and sound. The wood is cedar. We also have a creosoted arm. I don't know what the wood is, it is so hard to tell. We have so many kinds of wood in use that it is difficult to tell which is best."

T. L. Ingram, general superintendent of the Southern Bell Telephone and Telegraph Company, said:

"Our conclusions are that nothing is more satisfactory than the yellow-pine creosoted cross arm, taking into consideration its tensile strength, which will withstand strains that other timber won't. We have tried juniper, cypress and yellow pine painted, and some of this Western stuff which we do not like at all, and the creosoted yellow pine is, from our standpoint, the thing to be used. The painted arms were not satisfactory. They went too easily. I might say that in one case we were rebuilding a line of forty miles, and put on good juniper crossarms on the second arm and creosoted on the top. Then the sleet-storm struck us, and a very large percentage of those juniper arms broke from the dead weight of the ice. There was not a single creosoted arm broken, except where the pole gave away, and then it was probably broken when the pole struck the ground. We had several other cases where the juniper would not stand while the creosoted would."

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F. A. Stevenson, superintendent of plant of the American Telephone and Telegraph Company, said:

"We use practically nothing but the long-leaf pine creosoted cross arm except that we put in a small quantity of unpainted fir arms in the West. That has been within the last three or four years, and we have no definite results as yet. Our understanding is that the long-leaf yellow pine creosoted is better than long-leaf yellow pine painted. We have quite a number of painted arms that have been on the line about twenty years, apparently well seasoned when painted, but you have to take chances."

In summing up the discussion, Chairman Spalding said:

"The crowd seems to be down on the painted arm, generally on the basis that you do not know what it is you are painting. The painted arm seems to be no good unless it is well seasoned, and I question if it is feasible to find this out unless you do it yourself. It is a fact that a great deal of trouble is experienced with rotted arms on almost any line. I do not mean creosoted arms, but painted and unpainted arms."

Report of the Bureau of Labor into the Telegraph Companies.

We are in receipt of the report of the results of an investigation made, pursuant to a Senate resolution, by the Bureau of Labor into the Western Union and the Postal Telegraph-Cable Companies. The report is a voluminous document of five hundred and fifty-four pages, containing many interesting and valuable statistics covering the various departments of the telegraph service. The compilation shows intelligent and painstaking effort in its preparation, although the significance of the contents are undoubtedly far beyond the comprehension of the average statesman. However the facts, such as they are, are arranged in a manner that makes them easily accessible whenever they may be required, which renders the work of the bureau a valuable addition to statistical telegraph literature. The document starts out with a general discussion of the conditions in telegraph companies, and makes this important statement bearing upon the business relations existing between the telegraph and railroad companies:

"The Western Union Telegraph Company has a large number of railroad contracts establishing small offices at all points where the railroads are compelled to keep a telegraph operator for their own purposes. These operators are railroad operators, are agents often, and in addition to this they are frequently express agents. One of the complaints of the Western Union is that these railroad operators, having so many other things to look after, give the commercial telegraph business of the Western Union the least of their attention, and only transmit a commercial telegram when they have nothing else to do, and that much of the delay in transmission of messages originating in small offices comes from this source. The railroad contracts vary considerably in their terms. In a few cases the railroad gets all the profits from the commercial business; in most cases a varying percentage of the toll rates goes to the railroad or the operator."

In gathering the material for the report schedules were prepared covering the questions to be answered and placed in the hands of the two telegraph companies, with the request that they be filled out by representatives of these companies in twenty-seven selected cities and together with copies of the payrolls be returned to the bureau. In addition to this data supplied by the companies, information was obtained by special agents of the bureau who visited the cities selected and reported to the bureau data secured as the result of their personal observation and from interviews with individual telegraphers. In each city visited the managers of the companies were themselves requested to furnish to the agents of the bureau the names of telegraphers whom they desired to have the agents interview; in addition to those thus designated by the companies, the agents of the bureau interviewed a number of other telegraphers whose names were suggested by others than representatives of the companies.

An idea of the enormous amount of detail may be gained from the fact that all of the following conditions were investigated: Methods of handling the public business, business carried on by companies through their own employes, messages originating with the companies, messages originating with the public, arrangements with railroad companies and forms of contracts, leased wires and forms of contracts, franks, passes and deadhead messages, toll rates, physical working conditions, hours of labor and methods of work, split tricks, extra men, typewriters, the so-called black list, wages and earnings, overtime and bonus earnings, receipts and expenditures for a period of five years, and the growth of the telegraph business.

The appendix gives a digest of all state laws regulating the conduct of telegraph companies, with extracts from the principal sections of such laws. The book closes with a four-page description of the Postal Telegraph Employes' Association, its organization, objects, etc.

Passions are as easily evaded as impossible to moderate.

From the follies of youth usually spring many of life's after sorrows.

"The Practical Management of Dynamos and Motors," by F. B. Crocker and S. S. Wheeler, as indicated by its title, affords a clear understanding of the use, care and operation of these important adjuncts of the well equipped modern telegraph office. There is a constant demand for this book, for telegraphers find it an invaluable addition to their working library. There are 206 pages, and 99 illustrations; price, $1.

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Miss Medora Olive Newell, Postal Manager in Chicago.

Miss Medora Olive Newell, manager for the Postal Telegraph-Cable Company in the wholesale district office, Chicago, is probably the only woman telegraph operator in the United States, and for that matter in the world, who has been the guest of a great nation and feted by royalty. Such, however, has been her experience, and she is to-day serving her company as faithfully and well as she did before this remarkable distinction was accorded to her.

MISS MEDORA OLIVE NEWELL,
Manager, Postal Telegraph-Cable Company's office, wholesale district, Chicago.

About four years ago, Miss Newell happened to be returning to New York, after a trip to Europe for the benefit of her health, upon the same ship with the Hague peace commission, which was on its way to the United States to interest President Roosevelt in the second peace conference. The Hungarian members of the commission wished to send a wireless message of congratulation to Emperor Francis Joseph upon the occasion of his birthday, but the apparatus was out of order and the operator attached to the ship was unable to send the message. Miss Newell hearing of this, and having a good working knowledge of wireless, offered her assistance and the message was soon sent.

The Hungarians on board were so grateful to Miss Newell that they decided that she should be the guest of the Hungarian nation, and accordingly some time later she received an official invitation to be the guest of honor at a series of banquets in Hungary which had been arranged by the Hungarian members of the peace commission, chief among whom was the secretary of Parliament, a position which corresponds to that of speaker in our House of Representatives. Miss Newell spent nearly three weeks in Hungary, and was entertained most royally. It was planned that she should take the secretary's seat in Parliament and wield the gavel for a few minutes, but as Parliament was not in session at the time of her visit that part of the programme had to be omitted. She expects to return on another visit, however, and then receive that honor. Miss Newell is of course proud of the distinction that she has received, but has not had any false ambitions aroused thereby, and is well satisfied with her work as manager of one of the busiest branch offices in Chicago.

Miss Newell learned telegraphy when only fourteen years of age at Durango, Iowa, on the Chicago, Great Western Railway, and by hard study and diligent attention to her duties she advanced in her chosen profession and became train despatcher at Dubuque, Iowa, being, it is said, the first woman to hold such a position in that State. She later became despatcher in the office of the division superintendent at Des Moines going from this place to Chicago in 1899 to enter the employ of the Postal Telegraph-Cable Company, with which interests she has been identified ever since. Miss Newell has been in the habit of spending her vacations abroad, and has always made these trips the occasion for investigating telegraph and railway management and operation in European countries.

A ladies auxiliary to the International Order of Railroad Telegraphers was organized May 14 at the Atlanta Convention of that body. The following officers were elected: President, Mrs. E. B. Smith, of Atlanta; grand secretary-treasurer, Mrs. G. W. Malone, of Galesburg, Ill.; first vice-president, Mrs. E. L. Mathis, of Greenfield, Tenn.; second vice-president, Mrs. W. J. Laddanie, of St. Paul Minn.; third vice-president, Mrs. J. J. Campbell, of Toronto, Ontario; fourth vice-president, Mrs. Henry Hurr, of Engle, Texas.

At the biennial meeting of the Order of Railroad Telegraphers held recently in Atlanta, it was decided to hold the next convention at Toronto.

The following officers were all re-elected: H. B. Perham, of St. Louis, president; J. A. Newman, of St. Louis, first vice-president; T. M. Pierson, of St. Louis, second vice-president; D. Campbell, of Toronto, third vice-president; J. J. Dermody, of St. Louis, fourth vice-president; L. W. Quick, of St. Louis, secretary and treasurer, and C. E. Layman, of Troutville, Va., chairman of the board of directors.

Mr. F. D. Byrne has been appointed acting manager of the Duxbury, Mass., cable office of the company, vice Daniel D. Devereaux, deceased. Other Western Union operators at this point are Mr. Charles Alden, who has been stationed there for over forty years, and Mr. Newton, formerly of the cable department in New York.

The testimony of progressive operators is that Telegraph Age is so thoroughly comprehensive in character as to make it absolutely indispensable to those who would keep informed. Its technical articles are of high practical value. Write for a free sample copy.

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LETTERS FROM OUR AGENTS.

PHILADELPHIA, POSTAL.

The sympathy of the force is extended to Mr. John Shindine, in the recent death of his mother.

Richard Furlong, night operator at the Broad and Fairmount Avenue office, has resigned to accept a position as operator for a brokerage firm.

The telegraph department of the Pennsylvania Railroad have scheduled another meeting for educational purposes to be held in the Annex Building on June 6, and have extended an invitation to the employes of this company. The principal topic of the meeting will be "Power Machines." As these gatherings always prove interesting and entertaining, it is hoped that the members of the operating department will take advantage of this opportunity to be present.

PHILADELPHIA, WESTERN UNION.

Chief Operator J. P. McLoraine has been absent for several weeks on account of illness. This is the first time he has been absent from his duties since his appointment, and he is missed very much. George Merrihew is acting as chief operator during the absence of Mr. McLoraine. George W. Wood is acting as traffic manager, vice Mr. Merrihew.

Joseph R. Ketler, for many years manager of the branch office at Delaware avenue market, died recently after a brief illness of pneumonia.

C. E. Shinn and H. V. Emanuel have charge of the baseball business and are assisted by eight to ten operators during each game.

Harry V. Emanuel, besides his duties at the new Shibe Park, has charge of the sports at Franklin Field (University of Pennsylvania). Quite a number of operators accompany him each day.

W. A. Baldwin has been appointed manager at the "Bulletin" office, vice Mr. Rainear, returned to the main office.

R. C. Murray, chief of the wire chiefs, makes frequent trips to Atlantic City, where his wife is sojourning on account of ill health.

The mother of Messrs. O. M. and Charles Pennypacker, of this office, died recently at Norristown.

Miss Moyer, who is quite a brilliant young operator, is frequently transferred from the Barclay department to assist on the Morse wires and the receiving operators are praising her splendid work.

OTHER NEW YORK NEWS.

Assessment No. 493 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Norborne M. Booth, at Evansville, Ind.; Curtis L. Kinney, at Cortland, N. Y.; James A. Willson, at Cleveland, O.; Mrs. Marda L. E. Imperiali, at Denver, Colo.; Jefferson D. Dickenson, at Kansas City, Mo., and George A. Clark, at Galveston, Tex.

Obituary.

Thomas Barwick, a member of the United States Military Telegraph Corps, died recently at Pleasanton, Kan.

J. A. Weeks, a former telegrapher and at one time manager for the Western Union Telegraph Company at Muskegon, Mich., died at Seattle, Wash., April 29, aged fifty years.

James Renfrew, aged twenty-eight years, manager of the Western Union Telegraph Company at Chambersburg, Pa., committed suicide by hanging himself, May 8.

Oliver H. Day, aged forty-seven years, a Baltimore telegrapher, but who has worked in various cities throughout the United States, while on a fishing trip at Havre de Grace, Md., was drowned on May 14.

George B. Dresser, aged fifty-two years, an expert press operator, formerly of New York City, but for many years past in the brokerage business at Rochester, N. Y., died at that place May 20.

Mrs. Julia Smith, mother of Emmett Howard, who was, up to a few years ago, manager for the Western Union Telegraph Company at Memphis, Tenn., died at Blandville, Ky., May 7, aged eighty-six years.

Charles E. Rich, manager of the Western Union Telegraph Company at Grand Forks, N. D., committed suicide on his father's grave at Maquoketa, Iowa, on May 10. Business worriment was the cause of the act.

William J. Clark, a wireless telegraph inventor and manufacturer of wireless telegraph apparatus, died recently at Mount Vernon, N. Y. aged forty-eight years. Mr. Clark was a Canadian by birth, and in his younger days was a telegraph operator.

Adam Bruch, an old-time telegrapher, and during the Civil War a member of the United States Military Telegraph Corps, died at East St. Louis, Ill., on May 14. At the time of his death Mr. Bruch was employed as a train despatcher for the Illinois Central Railroad Company at that point.

Major Albert E. H. Johnson, of Washington, died May 12. Major Johnson was the private secretary of Edwin M. Stanton during the Civil War and also after the war until Mr. Stanton's death in 1869. He was the official custodian of military telegrams in the War Department and to his faithful, intelligent and loyal service great credit is given for the manner in which he recorded and filed the many thousands of important despatches passing through the War Department telegraph office during the Civil War. Major Johnson was present at the dinner given at the Hotel Manhattan, New York, by the Society of the United States Military Telegraph Corps to Andrew Carnegie, on November 27 last. He was the author of the expression, "the sacred three," by which Messrs. D. H. Bates, C. A. Tinker and A. B. Chandler have been known since the close of the war.

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Dr. Samuel M. Plush, an old-time telegrapher and for many years connected with the late Henry Bentley, of the Philadelphia Local Telegraph Company, died May 15, at Norristown, Pa. Dr. Plush was stricken blind a number of years ago. He at one time was a practicing physician, but abandoned the medical profession to enter the telegraph service. The last important position he occupied was as manager of the Bell Telephone Company of Philadelphia, which he had to give up when stricken with blindness.

William Spinner, of Eureka, Nev., manager of the Western Union Telegraph Company and a military telegrapher during the Civil War, died at that place, May 20, aged sixty-six years. Mr. Spinner has held important telegraph positions in Canada and throughout the United States since he was thirteen years of age. He had been county recorder of Eureka County, Nev., for the past sixteen years. An engraving and biographical sketch of Mr. Spinner appeared in our issue of September 16, 1908.

John E. Dunning, of Paterson, N. J., a well-known old-time telegrapher, but who has been in other business for many years past, died at his home at that place on May 15. Mr. Dunning was born at Whitesboro, N. Y., January 4, 1835. He became associated with the telegraph at Utica, N. Y., in February, 1851. He continued actively in its operation in various capacities in both commercial and railroad service until 1872, when he retired to engage in other business at Paterson. Mr. Dunning always retained a friendly feeling for the telegraph, and he, together with his wife, who died last November, were regular attendants at the reunions of the Old Time Telegraphers' and Historical Association. Mr. Dunning was also an occasional contributor to these columns of articles of an old-time reminiscence character, his last contribution appearing in our issue of April 1, written at a time when, as he stated, he was away from home, resting in the hope that the change of climate and surroundings would benefit his health, which was at that time very poor. An engraving and biographical sketch of Mr. Dunning appeared in our issue of October 1, 1906.

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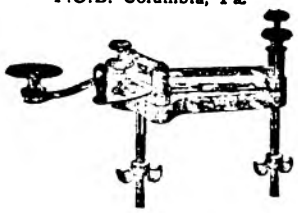

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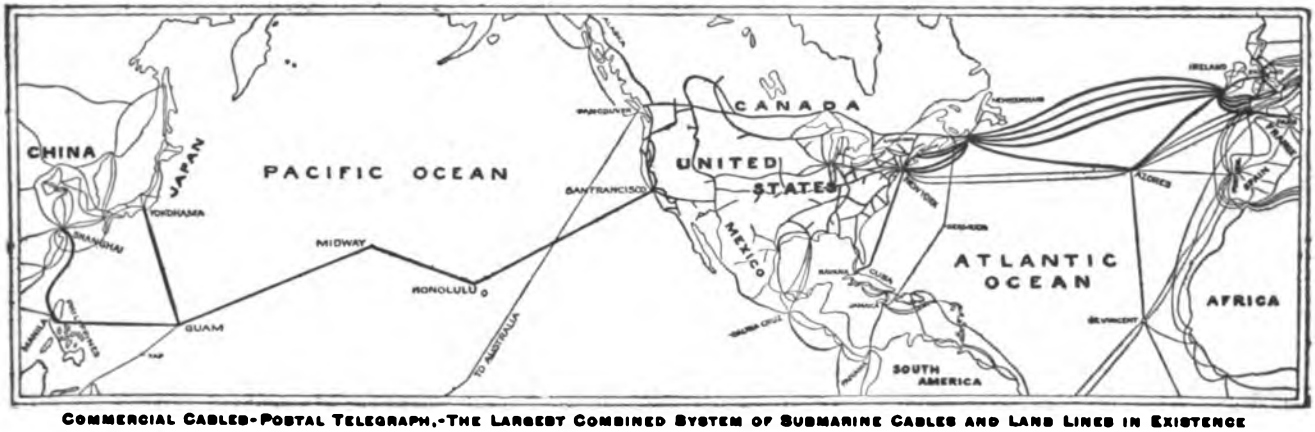

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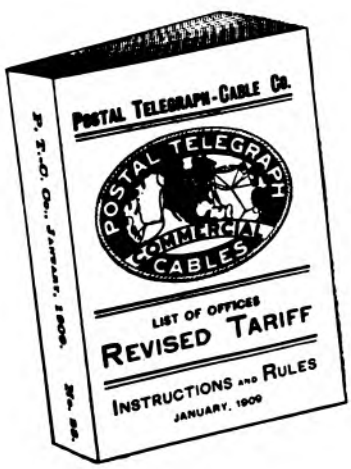

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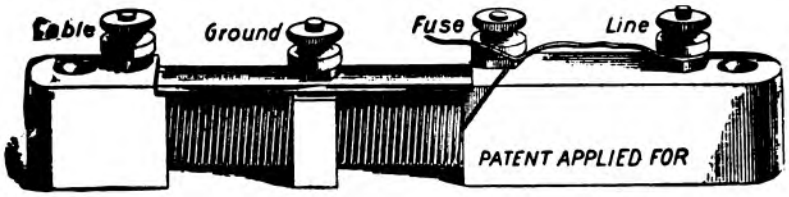

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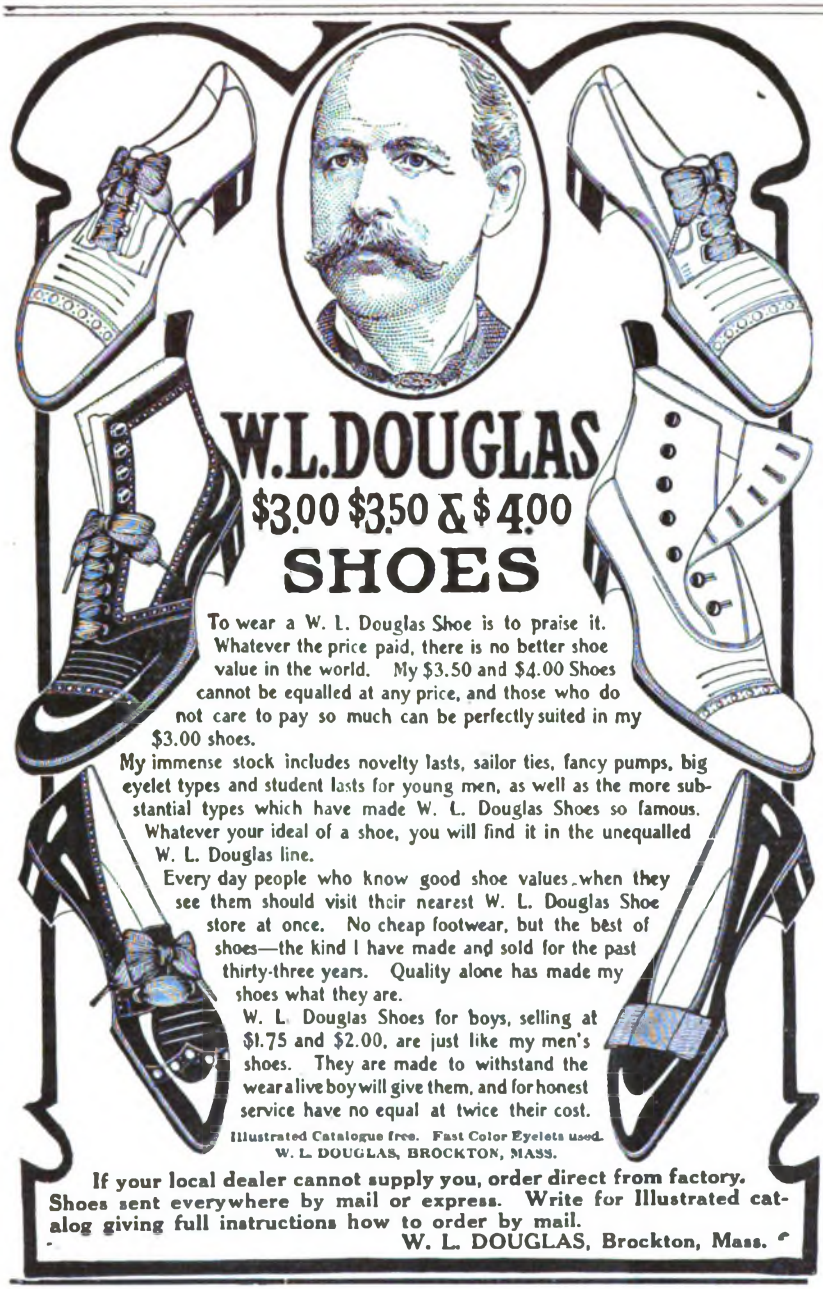

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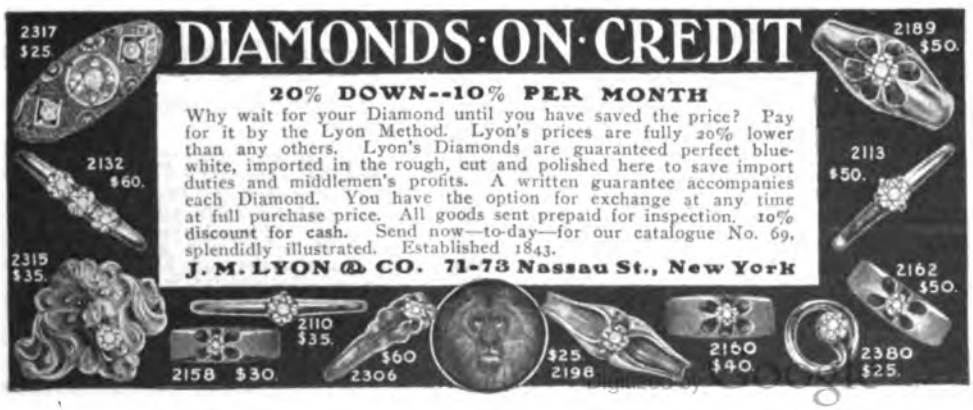

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TELEGRAPH AGE

No. 12 NEW YORK, JUNE 16, 1909. Twenty-sixth Year.

CONTENTS.

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Condenser.

PART II.

If we fill a quart vessel with expansive gas by forcing it in with a certain pressure, there will obviously be confined therein just one quart of gas, and the said gas will have an opposing pressure nearly equal to that which was used in putting it into the vessel.

As gas is compressible it is also obvious that this same vessel will hold different quantities of gas under different degrees of pressure notwithstanding the fact that the size of the receptacle itself remains unaltered. At the same time the intensity of the opposing force of the confined gas will vary in a degree corresponding with that of the pressure which happens to be used in filling the vessel.

Now electricity may be treated in a manner very much as though it was gas, for the reason that it acts as though it was compressible. Bearing this fact in mind, let us again take up the action of gas for the purpose of illustrating the construction of a condenser and the action of electricity therein.

If we force a given amount of gas into a vessel under a pressure of say one atmosphere, and expect such gas to return an equal back pressure it is quite evident that the receptacle must be of such a size or "capacity" that when the prescribed quantity has all been forced into it the gas will have such a density due to its confined quarters that the said back pressure will in turn have a force equal to one atmosphere. Hence, if a given volume of gas is used as one unit and one atmosphere pressure as another, the third term obviously represents the "capacity" or dimensions of the vessel that will create a back pressure of one atmosphere when filled with gas that was put into it under a like pressure. Thus we are able to obtain a unit of "capacity."

Now let us compare this action with that of electricity.

If we place an insulated metal plate in close proximity to another plate to which is connected an electric generator, but separated from the insulated plate by an air space, the insulated plate will accumulate through induction a certain quantity or "charge" of electricity, the volume of which will depend upon the size or superficial area of the plate holding such charge, other conditions being equal. If the voltage of the generator be increased the volume and the density of the electric charge will be increased correspondingly. The charge thus accumulated, like gas, is held in bondage on the plate until released by finding a connection with the earth. When released, however, it flies back in the opposite direction from the attraction which holds it with a force, measured in volts, by the intensity or degree of compression it acquired while bound. Hence in devising a means of measuring a charge of electricity, or rather, to construct a receptacle that will have a known capacity for holding electric charges of this kind, it is merely necessary to ascertain the size or superficial area of the plates composing the condenser which, with a prescribed charge of electricity induced thereon by a predetermined voltage or pressure, will cause the charge to possess such a density that when released it will have an electromotive force of its own, the value of which is also predetermined. In other words, if we construct a condenser possessing such an area of plates that one coulomb of electricity will be induced thereon by a pressure of one volt it will also have an electromotive force of one volt back pressure available for creating current in an external circuit when released. A condenser fulfilling these requirements would have a capacity of one farad, which term is called the unit of capacity.

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Now in actual practice we never deal with wires or other conductors possessing so great a capacity as one farad, at least not in the telegraph or telephone service. In fact, our longest and largest wires seldom possess a capacity of more than one or two millionths of a farad, and as the superficial area of a long wire represents its capacity it is evident that a condenser possessing a capacity of one farad would necessarily have to be of an enormous size. A good idea of its size may be obtained from the fact that an up-to-date tin foil condenser as now made requires about 3,600 square inches of surface to possess a capacity of one microfarad, or one millionth of a farad. The large condensers used on multiplex circuits usually run from one to three microfarads capacity, but only a portion of each is usually used, if they are of the adjustable pattern, for reasons which will become apparent further on in this article.

The principle involved in the construction of a condenser is this: When a metal plate is separated and thus insulated from a similar plate connected with an electric source it has an electric charge induced on it by the second plate across the insulator, or dielectric as it is called. But the amount of charge accumulated depends upon several other things which must also be borne in mind when building for maximum results.

First, we must consider the material used as a dielectric. Some insulators permit greater induction across them than others, consequently a greater volume accumulates, other things being equal. Second, with any given insulating material the induction becomes greater the closer together the plates are placed.

Third, induction between two plates becomes greater when the one receiving the charge is connected to the earth. The explanation is that if, say a positive charge from the generator induces the charge, the negative charge accumulated by the plate will be attracted toward the positive source, inducing it and force the latter across the intervening dielectric. At the same time some of the positive charge will be driven to the earth through the ground connection. This, of course, makes room for the reception of more electricity, which the generator at once supplies. This operation goes on until the potential of the charge equals that of the supply when further accumulation ceases.

Now air, glass and paraffin are considered high grade dielectrics. The first two are better than paraffin, but the latter permits the construction of a much thinner dielectric than if made of glass, and an air gap is impractical. Hence most standard condensers are now made of many thin sheets of tinfoil to hold the charge and thin sheets of paraffined paper to separate them as the dielectric. In "blind" condensers, the edges of each alternate sheet of tinfoil are soldered or otherwise joined together to form one large plate, and the companion sheets similarly treated for the other plate. In adjustable condensers the sheets are joined together in several groups and arranged so that all of them or any portion desired may be called upon for service.

(To be continued.)

Recent Telegraph Patents.

A patent No. 921,715, for telegraphy, has been granted to I. Kitsee, of Philadelphia, Pa. Uses rapidly recurring or induced impulses and polarized relays, together with a localized circuit operated only when no current is flowing through the relays.

A patent No. 921,784, for a polarized magnet, has been issued to E. A. Burlingame, of San Francisco, Cal. Detailed improvement in polarized relay.

A patent No. 922,099, for a polarized relay, has been awarded to R. L. Dean, of Kansas City, Mo. For printing telegraphs. Employs two tongues, two sets of contact stops and restores the tongues to normal after being actuated by the electromagnet.

A patent No. 922,206, for a composite signaling system, has been taken out by H. B. Stone, of Providence, R. I. The line circuit is used for simultaneous telegraphic and telephonic communications by means of a repeating coil having all of its secondaries connected in series with each other and with two sides of the line, the primary connected to the telephone branch and a connection from the telegraph branch to line through one of the secondaries.

A patent No. 922,462, for telegraphy, has been secured by T. B. Dixon, of New York. For multiplex telegraphy, transmitting three messages each way in which the neutral receiving instrument at each station is operated by successive current impulses which are too short to operate the ordinary receivers.

A patent No 922,781, for a printing telegraph, has been granted to I. Kitsee, of Philadelphia, Pa. Synchronism between transmitting and receiving apparatus is not necessary, the latter being controlled by a cable relay, which controls master intermittent mechanisms, each of which controls a plurality of printing surfaces.

A patent No. 923,033, for a telegraph transmitter, has been issued to T. J. Dunn, of Jersey City, N. J. The transmitter includes a horizontal vibrator, a vertical plunger, and a pair of electrical contacts, one carried by the vibrator and the other fixed.

The following patent has expired:

Patent No. 475,441, for a telegraphic relay, held by C. Cuttriss, of New York.

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Personal.

Mr. Louis de Goll, president of the Rowland Telegraphic Company, Baltimore, was a recent New York visitor.

Mr. Thomas Ahearn, the former well-known telegrapher, now a capitalist of Ottawa, Ont., was a recent New York visitor, and took occasion to call on many of his personal friends while in the city.

Mr. J. G. Splane, of Pittsburg, vice-president and general manager of the Pittsburg and Allegheny Telephone Company, and a member of the finance committee of the Old Time Telegraphers' and Historical Association, was a recent New York visitor.

Mr. L. C. Weir, the well-known military telegrapher, whose war experience was recounted in the columns of our May 16 issue, has after twenty-five years active service as president of the Adams Express Company, resigned that position on account of poor health.

Mr. Charles J. Glidden, the millionaire ex-telegrapher, of Lowell, Mass., now spends his time ballooning among the lightning flashes with wireless telegraph and telephone apparatus on his airships. Thirty years ago Mr. Glidden was contented to deal with the bottled up lightning found on the ordinary telegraph lines.

Mr. Robert J. Wynne, a well-known old-time telegrapher and for several years past Consul-General at London, has resigned his post with the government to return to the United States and engage in business. Mr. Wynne first came into public notice when he assisted in running down the post office frauds. He showed such an aptitude for the work that President Roosevelt made him Postmaster-General, afterward sending him to London as Consul-General.

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EXECUTIVE OFFICES.

Mr. Edward J. Nally, vice-president and general manager, accompanied by Mr. H. F. Hawkins, assistant secretary of the company, and Mr. W. I. Capen, general superintendent of plant, are on an extended trip of inspection which will take them to the Pacific Coast, and which will cause their absence from this city during the month of June. Mr. E. B. Pillsbury, general superintendent of the Eastern Division, accompanied the party as far as Chicago and St. Louis.

Mr. Minor M. Davis, electrical engineer, and Mr. S. B. Haig, superintendent of traffic, are on an inspection trip investigating electrical and traffic conditions of the company at various places, including Pittsburg, Columbus, Cleveland and Buffalo.

Among the recent executive office visitors were: Harvey D. Reynolds, superintendent at Buffalo, and Charles E. Bagley, superintendent at Philadelphia.

Colonel A. B. Chandler, chairman of the board of directors, has gone to his farm at Randolph, Vt., where he will spend the summer months.

On the afternoon and evening of June 26 the New York branch office managers will hold their second annual outing at Midland Park, Staten Island, on which occasion Superintendent C. F. Leonard will be the guest of honor. The committee has arranged a number of athletic games and prizes will be awarded to the winner of each event. A drawing for prizes will also be held for those who may be unable to enter the contests.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Jacob Levin, general superintendent at Atlanta, Ga., Mr. Theodore P. Cook, general superintendent at Chicago, and his son, Mr. Morris T. Cook, general agent, were in New York a few days ago to attend a conference of general superintendents in the interests of the service.

Mr. Charles H. Bristol, general superintendent of construction, accompanied by Mr. T. P. Cook, general superintendent at Chicago; Mr. George J. Frankel, superintendent at St. Louis, and Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific, has completed his trip of inspection over the lines of the Missouri Pacific Railway system.

Mr. George H. Fearons, general attorney of the company, accompanied by Mrs. Fearons and their son, sailed for Europe on June 5, to be absent two months.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., was in New York recently on a business visit.

The summer outing of the Morse Electric Club, which is to be held at College Point, Long Island, July 10, promises to be a most enjoyable affair. Colonel Robert C. Clowry, president of the company, having placed the cable tug "Western Union" at the disposal of the club, those who so desire may make the trip to the grounds by water. Baseball and other games will be indulged in, and the entertainment committee is making arrangements which will ensure comfort and enjoyment to all who contemplate being present.

RESIGNATIONS AND APPOINTMENTS.

Mr. L. D. Beall, assistant superintendent at Richmond, Va., has been appointed storekeeper of the supply department with headquarters at 152 Franklin street, New York, vice Ralph E. Bristol, resigned to engage in other business.

Mr. J. B. Faulkner, chief operator of the Richmond office, has been appointed assistant superintendent at that place, vice L. D. Beall.

Mr. F. Veale is acting chief operator of the Richmond, Va., office, vice Mr. J. B. Faulkner, promoted.

Mr. E. R. Tilghman has been appointed manager of the Commercial News Department of the Pittsburg, Pa., office, to succeed W. E. Price.

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Frank E. Schiller has been appointed general wire and repeater chief of the same office, vice Isaac N. Barto. D. W. Lewis, night traffic chief, is acting night chief operator, vice Mr. Schiller, promoted.

Mr. F. S. Lewis, manager at Niagara Falls, N. Y., has been promoted to the management of the Jersey City, N. J., office, vice J. B. Bertholf resigned after a service of thirty years as manager at that point. Mr. Bertholf's health has not been of the best of late and he will take a long needed rest.

Mr. C. F. H. Johnson, inspector of the second district, presided over by E. P. Griffith, superintendent, has resigned to enter the real estate business at Passaic, N. J. On retiring from the telegraph service he was presented by his old associates with a handsome gold watch suitably engraved.

Mr. L. P. Tabor, traffic chief of the New Orleans office, has been advanced to the position of manager at Chattanooga, Tenn., vice E. Chaddick, resigned.

Western Union Quarterly Meeting.

At the quarterly meeting of the directors of the Western Union Telegraph Company June 9 there was issued an estimate of the income from operation during the current quarter showing net revenue at practically $1,700,000, against $1,684,000 for the first quarter of the year and $1,579,000 in the corresponding quarter of 1908. After paying interest on bonds, fixed charges, etc., the surplus amounts to $1,266,000, or one and one-fourth per cent. on the company's stock, on which a dividend of three-fourths per cent. was declared. President Clowry, in a statement, estimated net earnings for the fiscal year as equal to practically five and one-half per cent.

The Cable.

The West Indian and Panama Telegraph Company has constructed wireless stations in British Guiana and Trinidad as an addition to their present cable connection between the two colonies.

Cable communication is interrupted June 14 with:

Madura Island (Dutch East Indies)	Feb. 3, 1908
French Guiana	June 7, 1909

Mr. J. D. Gaines, superintendent of the Commercial Pacific Cable Company at Honolulu, where he has been located since the establishment of the cable seven years ago, is visiting in this country on an extended vacation.

A patent, No. 922,780, for a cable relay, has been granted to I. Kitsee, of Philadelphia, Pa. For submarine cable work. To avoid the shifting zero in a siphon recorder. The relay has two moving coils and each carries a movable contact.

Municipal Electricians.

A patent, No. 923,115, for a frangible protecting device, has been issued to F. W. Cole, of Newton, Mass. For fire-alarm boxes, in which a self-opening door with a glass plate and shield back of the plate are so arranged that the shield prevents the broken glass from entering the opening into the box.

The city of New York has made an appropriation of $100,000 to begin the installation of a new fire-alarm system. This system has been under consideration for the past six years, and a very elaborate report upon the subject was prepared some two years ago by Mr. Kempster B. Miller.

Wesley D. Claiborne, aged forty-seven years, superintendent of fire-alarm telegraphs at Savannah, Ga., and a former well-known telegrapher, died recently. Mr. Claiborne was a prominent member of the International Association of Municipal Electricians and was an attendant at many of the annual gatherings of this association.

The members of the International Association of Municipal Electricians are looking forward to their fourteenth annual convention, which will meet at Atlantic City, N. J., September 14, 15 and 16. Mr. A. C. Farrand, chairman of the committee on arrangements, is preparing comprehensive plans for the entertainment of the guests at the convention and will see that ample space is provided for all supply men who may propose to make exhibits. All questions concerning the coming meeting will be gladly and promptly answered by the secretary of the association, Mr. Frank P. Foster, of Corning, N. Y.

Trolley Induction Litigation.

Judge Tuthill, of the Laporte, Ind., Superior Court, has denied a suit for an injunction brought by the Western Union Telegraph Company against the Chicago, Lake Shore and South Bend Traction Company, asking for a perpetual restraining order against the continued operation of its high-tension single phase trolley system. 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.

Similar suits asking for injunctions were brought by the Lake Shore and Michigan Southern Railway Company, and the Postal Telegraph-Cable Company.

Mr. C. W. L. Mickley, superintendent of telegraph of the International and Great Northern Railroad Company, Palestine, Tex., in a letter renewing his subscription, states, "I never fail to speak a good word for Telegraph Age. I had the pleasure of reading the first copy in 1883, and hope to continue reading the paper as long as it is published."

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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 377, June 1 issue.)

At the time when the first long-distance underground cable was laid, it was considered that it would not be advisable to attempt to draw into pipes lengths of lead-sheathed cable longer than 137 metres, and this circumstance naturally determined the normal length of the pipe sections, i. e., the distance between the centers of two consecutive cable joints. When the cable was extended northward from Birmingham, the length of 137 metres was adhered to as far as Carlisle. It was naturally recognized that the cable joints were the weak points in the system, and the question of reducing the number of joints was reconsidered when the latter place was reached. Experience had shown that cables on drums, the total weight of which did not exceed 3,600 kilograms, could be conveniently transported by rail and road, and did not offer any difficulty in handling in connection with cable operations. Since it was ascertained that the weight of the cable, designed to bridge the distance between Carlisle and Glasgow, was such that a length of 201 metres of the same, together with its drum, would not exceed 3,600 kilograms, the length of the pipe sections north of Carlisle was increased from 137 metres to 201 metres. More recently the tenth part of an English mile has been adopted as a convenient length for pipe sections where eight-centimetre pipes are used. In the case of ten-centimetre pipe lines the length of the sections is 108 metres.

Wherever possible, pipes have been laid under recognized footpaths, or under the roadside wastes and grass margins, metaled and paved portions of roadways being avoided as far as possible. The trenches are of such depth as to provide a covering of thirty-five centimetres measured from the upper side of pipes laid under footpaths, and a covering of sixty centimetres similarly measured where pipes are under grass margins or metaled roadways.

The actual methods employed in laying the pipes do not call for special comment. Every precaution is naturally taken to ensure the inner surface of the pipe line when laid being perfectly smooth, so that no injury may result to the lead sheath during the process of drawing the cable into the pipes. For this reason, and to ensure that all the pipes are of the requisite diameter to admit the type of cable which it is proposed to draw in, an iron mandrel, three millimetres less in diameter than the specified minimum diameter of the pipe, is drawn through the completed section of pipe work, and any obstruction or irregularity discovered is rectified.

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

Taper plugs of hard wood are inserted into each end of every pipe section on its completion, to prevent the entry of soil, etc., into the pipes. These plugs are well soaked in water before being inserted into the pipes, so as to provide against the pipes being split by the swelling of the plugs, should the soil become water-logged after heavy rains or floods. At the positions where the cable joints will occur gaps are left in the pipe work; the length of these gaps varies from 1.25 to 1.5 metres, and is determined by the character of the protection to be provided for the cable joint in each particular case.

As the work progressed a sketch of the route was prepared, giving landmarks and measurements, and at every joint opening an oak stake, branded with the distance from the opening, was driven into the hedge bank to act as a temporary marking post.

The rate at which the pipe laying proceeded under each contract varied considerably. On some of the more recent works, pipes have been laid at the rate of about eleven kilometres per month, but eight kilometres per month is considered to be good progress under one contract.

The prices at which the pipe laying has been carried out by contractors have naturally varied according to the locality and to the nature of the soil which has had to be excavated.

Three methods have been adopted for protecting cable joints on the main underground routes, viz.: Joint boxes; cast-iron flanged couplings with groove; cast-iron solid slides.

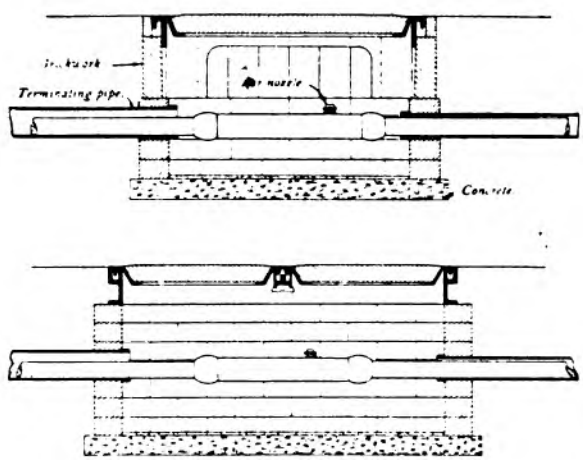

FIGURE 2.

Joint boxes are employed at points where cable joints fitted with air-nozzles have to be made under pavings which it would be costly to disturb when access to the cable is required. I have included drawings showing two of the types of joint boxes generally used. In the upper part of Figure 2 is shown the extra large joint box used under normal circumstances, and in the lower part of Figure 2 the double junction which is used at sharp angles and also when the pipes have to be buried at a depth greater than forty-five centimetres. The terminating pipes shown in the draw-

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ing are to accommodate the lead joint sleeve while the conductors are being jointed, and thus enable the dimensions of the boxes to be reduced to a minimum.

The cast-iron flanged coupling with groove is employed at points where the cable joints are provided with air nozzles, and can be conveniently buried under light soil, involving small cost for excavation and reinstatement, the cast-iron solid slides being employed under similar conditions at cable joints where no provision is made for desiccating the cable. The usual practice is to provide an air nozzle at every fifth joint of the cable.

At intervals of approximately eight kilometres pillar test boxes are fixed, into which cable connection boxes are fitted. The cable conductors are led into these cable connection boxes. which form convenient points for making all ordinary electrical tests, and also facilitate the air drying of the cable should moisture obtain access to the paper and lower the insulation of the conductors.

Some parts of the country traversed by the pipe tracks are very sparsely populated, so that the men employed by the contractors had to be accommodated in tents, and occasionally it was found difficult to keep the men together. For instance, while work was in progress in Scotland, the numbers of men employed daily on a particular section of the work varied from fifteen to forty.

Each contractor's gang was closely supervised by a clerk of works, on behalf of the Post Office. The duty of this man was to see that the conditions of contract were strictly adhered to, and also that the pipes were set in the proper alignment, especially round curves in the road. He also took note of all deviations from the contract, such as extra depth, concreting over pipes where they had to be brought near the surface, etc. The clerks of works were frequently visited by the engineer, to whom all matters were reported. The checks employed made it possible to certify the contractors' accounts promptly, as all particulars relating to extras were always recorded up to date.

At the time that the underground works were first commenced it was felt that, as the security of the telegraphic communications depended in such a large measure on the uninterrupted use of the long-distance underground circuits, too much care could not be bestowed on the operations in connection with the laying and jointing of the cables. It would have been very unsatisfactory to entrust this class of work to men in the employ of contractors, whose employment with the Post Office Engineering Department could only be of a very temporary nature. In consequence it was decided that all the work in connection with cable laying and jointing should be executed by workmen in the direct employ of the Postmaster-General. The advantages arising from the adoption of this course will be evident when it is realized that the services of the men thus employed have been practically permanent with the Telegraph Administration since the commencement of the work. Further, the freedom from interruption arising from faults due to bad workmanship, to which a reference will be made later, may in a large measure be traced to the procedure adopted.

It has been already stated that along some parts of the route the contractor's men engaged on pipe laying had to be housed in tents. This was also the case with the men engaged by the department in connection with cabling operations. Tents and other articles of camp equipment were obtained on loan from the War Department, and camps were formed and arrangements for cooking food were made by the Telegraph Administration free of cost to the men employed.

As might be expected, our administration has not adhered to the type of cable which was laid over the first section of the northern route, but we have continually endeavored to effect improvements in the type of cable as the system has been extended. This is exemplified by the fact that no less than three different types of cables have been used on the main line to the north, London to Glasgow, a total distance of 650 kilometres, with a total length of wire of nearly 60,000 kilometres.

The first type of cable was laid between the years 1897 and 1900, and is 187.6 kilometres in length. The conductors, which are seventy-six in number, are laid up in quadruple form for a distance of forty-eight kilometres, and for the remainder of the distance are in twisted pair formation. Electrical and other data relative to this cable are as follows:

Weight of conductor per kilometre	.68 kilograms.
Resistance	3.638 ohms.
Wire-to-wire electrostatic capacity	.042 microfarad.
Thickness of insulating paper	.0635 millimetre.
Thickness of lead sheath	4.06 millimetres.
External diameter of cable	6.667 centimetres.

In the interval between the laying of the first and second cables the type of cable for long underground circuits had undergone considerable change. The second section of cable consists of 103 conductors, seventy-four of them being laid up in twin formation, the remaining twenty-nine being single conductors, paper insulated, and served with a spiral wrapping of soft copper foil round each conductor. The copper foil is .076 millimetre thick and 7.62 millimetres wide, and is taped with an overlap of 30 per cent.

The wrappings of copper foil round the several conductors are in contact with each other, and are also in contact with the lead sheath of the cable, as they form the external layer of conductors in the cable. Each conductor so treated is thus surrounded by an earthed screen, which completely shields it from the electrostatic action of currents rapidly rising and falling in neighboring conductors. To some extent the copper foil acts also as an electro-magnetic screen, and the conductors, though adjacent in the cable, are nevertheless capable of working over long distances without appreciable mutual inductive interfer-

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ence. The seventy-four wires laid up in twisted pairs form the central portion of the cable, the screened wires surrounding them. They are arranged so that different "lays" or lengths of twist are given to the groups of pairs in the several layers. This procedure prevents the mutual interference which would take place if pairs of the same length of lay were revolved together.

Particulars of the second section of cable, which is 128 kilometres in length, are as follows:

(a) Weight of screened conductors per kilometre, 31.78 kilograms.
(b) Weight of twin conductors per kilometre, 45.4 kilograms.
Resistance of (a) per kilometre.....7.796 ohms.
Capacity of (a), per kilometre.....09 microfarad. (wire to earth)
Resistance of (b) per kilometre.....5.457 ohms.
Capacity of (b) per kilometre.....04 microfarad. (wire to wire)

The thickness of the paper insulation is .63 millimetre and that of the lead sheath 3.94 millimetres, the external diameter of the cable being 6.854 centimetres. The weight of the copper foil is approximately equal to the conductor which it encloses.

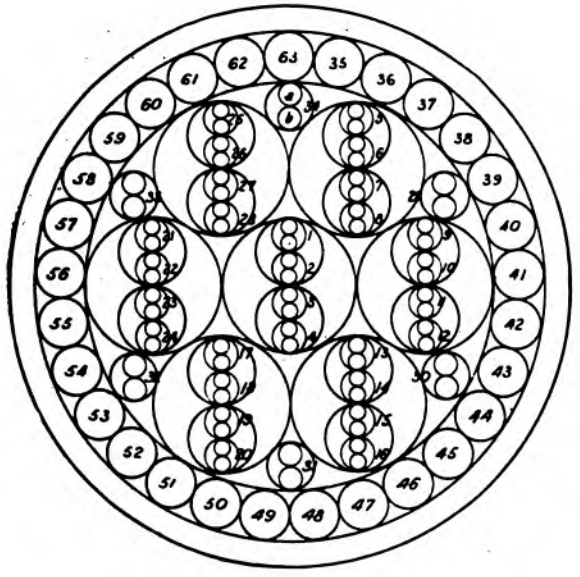

FIGURE 3.

The third cable marks a still further development in trunk cable manufacture. In this case the inner or central portion of the cable consists of sixty-eight wires, twisted in pairs. Surrounding these are twenty-nine screened conductors. The characteristic of this type of cable lies in the peculiar method adopted in twinning the groups of pairs. Of the sixty-eight conductors, fifty-six are formed into seven groups, each group consisting of eight wires. The method known as successive twinning is adopted, that is, two twisted pairs are twisted together to form a four-wire group or wire and two such groups are twisted together to form an eight-wire group or core. The seven groups thus formed are arranged with one group in the center, surrounded by the remaining six groups. In each of the six spaces between these six eight-wire groups and the outer layer of twenty-nine screened conductors is placed a twisted pair of conductors. These are known as worming pairs. The complete cable thus consists of one eight-wire multiple-twin core as a center with six similar cores surrounding it, then six twisted pairs, and finally twenty-nine screened conductors.

Particulars of this cable, which is 335 kilometres long, are as follows:

(a) Weight of conductors in the 8-wire cores per kilometre .....45.4 kilograms.
(b) Weight of worming conductors per kilometre, 68 kilograms.
(c) Weight of screened conductors per kilometre, 31.78 kilograms.
(d) Resistance of (a) per kilometre.....5.457 ohms.
Capacity of (a) per kilometre.....040 microfarad. (wire to wire)
(e) Resistance of (b) per kilometre.....3.638 ohms.
Capacity of (b) per kilometre....0.040 microfarad. (wire to wire)
(f) Resistance of (c) per kilometre.....7.796 ohms.
Capacity of (c) per kilometre....0.090 microfarad. (wire to earth)

The thickness of the paper insulation is the same as in the two previous cables, and that of the lead sheath 3.81 millimetres, the external diameter of the cable being 6.858 centimetres.

Figure 3 gives a diagrammatic representation of the cable.

The object of multiple twinning is to arrange that conductors may when necessary be bunched, that is, joined in parallel to any desired extent. By this means circuits of great conductance are obtained without anything like a proportional increase in the electrostatic capacity. For instance, an eight-wire core will furnish four loops with conductors of 45.4 kilograms, two loops of 90.8 kilograms, or one loop of 181.6 kilograms. The loop or loops thus formed will furnish a pair, or pairs, of twisted conductors, and so possess the advantage of freedom from inductive disturbance. The system also admits of the provision of additional circuits by superimposing upon the twisted pairs, whether of single loops or bunched loops. A further reference will be made to this.

(To be continued.)

The Bankrupt Yetman Transmitter Company.

The property of the Yetman Typewriter-Transmitter Company will be sold at public auction, June 17, at 10.30 a. m. This sale which has been ordered by the Trustee in Bankruptcy, Mr. Guy Van Amringe, will be held at the Yetman factory, at North Adams, Mass., and will include the real estate, equipment, stocks, patents, etc., owned by the bankrupt company.

Mr. H. L. Clark, manager of the Western Union Telegraph Company at Marietta, O., says that Telegraph Age is always a welcome visitor to his office, and he would dislike to miss a copy.

Comparison of New Telegraph Systems.*

BY M. JOSEPH HOLLOS, OF BUDAPEST.

Hungarian Technical Telegraph Councilor.

Most of the new telegraph systems have appeared during the last twenty years. The number of words that can be transmitted by the Pollák-Virág, Rowland, Siemens-Halske and Murray apparatus is enormous, and if, notwithstanding this great capacity, these machines are not commercially used, there must be some underlying reason. I should like to aid in throwing light upon this question as far as I may in the limited time at our disposal.

In order to determine the capacity of a telegraph apparatus we must first understand the character of the traffic to be handled, that is the nature of the correspondence, the distance of transmission and the tariff prevailing.

1. Telegraphy has undergone a change since the general introduction of the telephone. The public uses the telephone as much as possible for all communications where a direct exchange of ideas is indispensable, even if it is necessary to send a telegram to make a telephone appointment Even the newspapers prefer a telephone message taken down stenographically. The telegraph is only now used in cases where, the quickness of transmission being equal, it is important to have a written record of the communication.† Telegrams are presented for transmission singly, their transmission must, therefore, take place in varying numbers as and when received from the public. As soon as received, they must be transmitted without waste of time in preparation for transmission and in an accurate manner. But the affluence of telegrams is exceedingly variable during the different hours of the day, and even during the different seasons of the year. Telegraphy shares this unfavorable condition in common with other electrical services. In the morning the business world open their letters, make their plans and telegrams are sent in all directions. The traffic attains its maximum about 11 a. m., at noon it falls off during luncheon, after which the answers come in, producing about 4 p. m., a second maximum a little smaller than the first. These daily maxima differ with the seasons of the year; with us, the highest are noted during the month of August.

Without entering into a detailed discussion of the co-efficients of telegraphic traffic, I take it that it may be considered exceedingly variable and that few administrations are in such an exceptional position and supplied with such an extensive system of wires that the maxima appearing successively in different regions result in anything like a regular daily mean.

In small countries where the postal service is well organized with the rapid trains of the present day it may be counted upon as a successful rival of the telegraph; but this is not the case in countries where the great commercial centers are separated by distances which cannot be covered by the express trains in less than twenty-four hours. In such countries night rate telegrams are a success.

We have seen that in general telegraphic traffic is variable and that the conditions where it is not so are rare. But there is the case where a delay of a few minutes is not important where the distance is very great as in transatlantic telegraphy; or again where a mass of traffic is limited to certain hours like press telegrams or night telegrams in the United States which are received before nine o'clock or before eleven o'clock in the evening for delivery the next morning so as not to conflict with the day traffic. But these two cases are exceptions, and we will speak of them further on. In general, if telegraphy is to answer its purpose exactly, the telegrams must be transmitted without preparation and in the order of their reception; this is an essential condition.

2. Distance is of great importance because as it increases the difficulty of transmission increases disproportionately. Repeating is not alone a pecuniary consideration but also entails a loss of time. As you know from experience, this difficulty cannot be remedied by a corresponding increase in the number of relays. The use of relays is expensive and requires experts. For this reason direct wires for long distances are used as much as possible, and at present the bronze wire is used under these conditions. But varying atmospheric conditions on one hand and the work of repair and upkeep of the lines on the other cause enormous difficulties in the working of these long direct wires. If we reflect that oftentimes ten gangs of workmen are busy at the same time on different parts of a line of 1,000 kilometres in length (625 miles) you may conceive that, in spite of the greatest precautions, interruptions are inevitable.

3. Finally, I may say a few words relating to the tariff, and, as far as that may interest us, from a technical point of view. The traffic may be increased by a reduction of the tariff even to such an extent that the systems of great capacity which seem at present ahead of the times might be generally employed. It remains to examine what would be the financial result. It is true that this is not the most important question with continental administrations, but it merits nevertheless our attention.

The most important feature is speed, and in this respect, the great capacity systems appearing during the last few years should be preferred. We will examine their relative output. Measured in words of five letters each, this output is, hourly, as follows:

* Translation of paper read at the first International Conference of the Engineers of Telegraphs and Telephones in Budapest, September, 1908.

† The telegraph is used to a large extent where a written record is not important, but because the sender does not wish to consume the time required to get into direct telephonic communication with his correspondent.

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Morse Simplex	1500	proportion	1
Morse Duplex	2700	"	1.8
Hughes Simplex	3600	"	2.4
Hughes Duplex	5760	"	3.84
Baudot Quadruplex	5760	"	3.84
Rowland Octoplex	20000	"	13.33
Murray Duplex	22000	"	14.66
Siemens-Halske..	24000	"	16.00
Pollak-Virag..	50000	"	33.33

But these are not working figures, they simply imply that if all is ready and the wires are in perfect condition for them they can send the given number of words. But in commercial telegraphy other operations must be taken into account: the telegrams must be collected and receipted for; line interruptions, temporary but inevitable, entail some repetitions, so that the figures above given must be reduced. We may now exclude the Morse apparatus because we only wish to consider the most recent systems. The commercial output, therefore, is as follows:

Hughes Simplex..	3000	proportion	1
Hughes Duplex	4500	"	1.50
Baudot Quadruplex	4500	"	1.50
Rowland Octoplex	18000	"	6.00
Murray Duplex..	16000	"	5.34
Siemens-Halske..	18000	"	6.00
Pollak-Virag..	36000	"	12.00

These outputs, compared with that of the Hughes, are imposing, but, before accepting them, certain practical telegraph considerations must be examined. In the outset, if we wish to transmit such a great traffic upon a single wire we must take into account the unfavorable conditions that present themselves on all wires in the summer time because of the inevitable work of construction and repair, and in the winter time because of weather conditions. Every one of us knows that, even with the greatest precautions it is impossible to avoid "swings" and "grounds." Let us see what the consequences are.

With the Hughes, the Baudot and the Rowland, when false letters are printed the receiving employe interrupts the sending employe, who repeats all after the last word correctly received. With the high capacity machines that transmit by means of perforated tape several telegrams, perhaps the whole of a series, are received with errors. The incorrect portion has to be repeated after the series is finished, and it is often better to repeat the whole series. A great loss of time results, and a reduction of the output which, if the interruptions are frequent, as happens when repair work is going on on the line, falls well under half of the normal figure. It will be objected, perhaps, that this is not the case and that advantage may be taken, with these rapid machines, of the short intervals when the wire is in good condition to transmit all the traffic. This would be possible, but we do not control these intervals, as they appear at irregular moments, the series would be received partly correct and partly imperfect. It is also more difficult to correct errors with these systems than with the direct system such as the Hughes, the Baudot or the Rowland. It is more difficult because the transmitter and the receiver are not in such close touch, and the transmission is so rapid that the operators cannot follow it.

Aside from this, as telegrams cannot be delivered without verification, it is necessary to divide them among numerous employes, hence a new loss of time. It is the same thing with the preparation of the tapes, in order to be able to transmit these telegrams immediately, especially when the traffic is heavy, perforating operators must be present in numbers sufficient to translate all the telegrams into perforated tape without delay; these operators take as much time for this work as would be necessary to transmit to the receiving station directly by the Hughes, Baudot or Rowland. If it is admitted that ten minutes are required for perforating and the prepared tapes are transmitted every ten minutes an effective loss of time is shown. If following this the transmission requires ten minutes, and ten minutes more are necessary as an average for verifying the telegrams received and to get them in order, a total loss of thirty minutes is shown to the disparagement of the systems for automatic transmission. In addition to this, these systems require a more numerous and a more expert personnel.

For lines longer than 200 kilometres the circuit must be of bronze to afford the electrical qualities necessary for good transmission of rapid signals, and the price of a bronze wire is double that of an iron wire upon which the direct systems (Hughes, Baudot, Rowland) work successfully up to 600 or 700 kilometres. The systems for automatic transmission require a more numerous personnel which is their principal defect.

To better illustrate these two questions, I have combined in the following table the comparative results of the different systems based upon a circuit of 600 kilometres and an output of 18,000 words per hour (See table No. 1). Beyond 600 kilometres the working is difficult with the automatic systems and, if relays are inserted in the circuit, there are new difficulties to surmount.

It is true that the advocates of the system of perforating preparatory tapes insist that the public will prepare the tapes leaving nothing to be done but to pass them through the apparatus. Let us examine this subject in its details. The newspapers and great commercial houses would present the perforated tapes when they wished to telegraph long distances where the post could not arrive before the next morning; for shorter distances the post suffices. For urgent communications, for evening press telegrams or special editions, the telephone gives good service especially with the use of abbreviations, special expressions and stenography for receiving. This good service of the telephone is in some degree due to the rented wire. Is it not quite natural to fall into the same arrangement with the telegraph? In America the newspapers and large

business houses rent telegraph wires for certain hours of the day and take advantage of the remarkable skill of special operators in handling the transmission and the work connected with it. The employes of a government administration can never attain such skill as they are not called upon to work continually at one special kind of transmission. The necessity for presenting telegrams in the form of perforated tape is not yet near, and there is all the time that may be desired to prepare the necessary arrangements; but it is probable that commercial houses and newspapers, which among us too are getting more and more into the hands of the capitalists, will obtain these advantages by the renting of wires.

The advocates of telegraphic systems employing perforated tapes also lay stress upon their availability for handling telegrams which are to be distributed in various directions. Practice has found another way which I think a good one. Every telegraph administration has to transmit telegrams of public interest: weather reports, stock exchange quotations, standard time, as well as service messages to all of its bureaus. The same telegram is sent out on all the wires with a single manipulation by means of concentrating switches, which is simpler than the use of the perforated tape.

As I have demonstrated, the automatic telegraphs do not save time. On the contrary they occasion delays because, during the perforation of the tapes, the direct systems can transmit to the receiving station those telegrams which nowadays are the most numerous, that is to say, the telegrams which come in one at a time. Transmission from perforated tapes entails then, in practical telegraphy, additional delays. In the transmission of these telegrams promptness is important, as in all intercommunications of intelligence, close touch between the two correspondents. With the systems we are considering this is not realized in so high a degree as with the Hughes, with the Baudot or with the Rowland.

It remains only to examine the question of costs. It is a great objection that they require a numerous personnel which can only be utilized during certain hours. We can only give approximate figures because different conditions exist even in a single telegraph administration, but these will suffice to give an idea. These figures are based upon a distance of 600 kilometres (375 miles), an average distance where we can often find a heavy traffic. I will suppose that from 8 a. m. to 6 p. m. that is during ten hours, there are 60,000 words to transmit, that the peak load is three times the hourly average or 18,000 words per hour. It is evident that, even if the system employed can carry all the traffic on one wire, a single wire cannot be relied upon; in case of line interruption there must be a reserve wire on another route. We must note that if the wire in use becomes defective more time will be lost in obtaining a workable wire than with the systems which require several wires (See table No. 2).

These figures do not show in favor of the automatic systems. The high expense shown for the Baudot System results from the cost of the apparatus which is still high. But this apparatus and the Rowland apparatus offer the great advantage that the correspondence need not be equal in both directions. In addition to this the Baudot can be used for way stations. A rearrangement of these figures in three principal items will give a clearer showing (See table No. 3).

As I have before remarked, these figures do not pretend to be absolutely correct, but are instructive in various respects, and explain why these brilliant and ingenious inventions have not up to the present time been adopted.

The real need is for some other solution, and it seems to me that M. Mercadier is on a better track with his multiplex telegraph which enables us to use our ordinary apparatus in numbers upon a single wire according to the momentary needs of the traffic.

This has been the track followed by our practical English colleagues. The Americans, who are not less keen, have also adopted this method. Indeed they are no longer using the sounder on the large circuits, but the Barclay printing apparatus. This leads me to the conclusion that the printing system capable of being used in multiples on one wire according to volume of the traffic is the system of the future.

TABLE NO. 1.

	Hughes Simplex.	Hughes Duplex.	Baudot Quadruplex.	Rowland Octoplex.	Murray Duplex.	Siemens-Halske.	Pollák Virag.
Number of iron wires	6	4	4	..	..	..	..
Number of bronze wires	..	..	..	1	1	1	2
Number of machines	12	16	8	2	2	2	2
Chief	1	1	1	1	1	1	1
Operators	12	8	8	8	2	2	2
Auxiliary Personnel	..	.			12	12	12
Value of wires in francs	360,000	240,000	240,000	120,000	120,000	120,000	240,000
Value of machines in francs	20,000	32,600	200,000	30,000	36,000	51,000	56,000
Value of wires in dollars	72,000	48,000	48,000	24,000	24,000	24,000	48,000
Value of machines in dollars	4,000	6,520	40,000	6,000*	7,200	10,200	11,200

*The price of the present standard model Rowland Octoplex (with tape printers) is 65,000 francs, or 13,000 dollars. This difference will modify tables Nos. 2 and 3: Reserve fund (for machines) 3900 francs, instead of 1,800 francs. The repair of a Rowland Octoplex installation has been shown by six years' experience to be 3,500 instead of 5,000 francs, which about offsets the difference.

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TABLE NO. 2.

	Hughes Simplex. 1	Hughes Duplex. 2	Baudot Quadruplex. 3	Rowland Octoplex. 4	Murray Duplex. 5	Siemens-Halske 6	Pollák Virág 7
Maintenance of wires*	43,200	28,800	28,800	6,000	6,000	6,000	12,000
Interest on cost of wires	14,400	9,600	9,600	4,800	4,800	4,800	9,600
Wires in reserve, total***	.....	.....	.....	10,800	10,800	10,800	21,600
Maintenance of machines	3,000	3,260	10,000	3,000	3,000	5,100	5,600
Reserve fund (for machines**)	1,200	1,956	12,000	1,800	2,160	3,060	3,360
Reserve machines or parts	300	200	3,000	900	1,080	2,130	1,680
Repairs	3,000	3,000	4,000	5,000	4,800	4,200	3,400
Chief	5,000	5,000	5,000	6,000	6,000	6,000	6,000
Operators	43,200	28,800	28,800	40,000	10,000	10,000	10,000
Auxiliary personnel	.....	.....	.....	.....	37,700	37,700	37,700
Totals	113,300	80,616	101,200	78,300	86,940	89,790	110,940

* Not above 4%.

** 5% for columns 1, 2 and 3; 6% for the others.

*** The total annual cost of a reserve wire may be considerably reduced by crediting against it the almost continual other uses made of the wire when notrequired for these systems.

TABLE NO. 3.

	Hughes Simplex. Total	%	Hughes Duplex. Total	%	Baudot Quadruplex. Total	%	Rowland Octoplex. Total	%	Murray Duplex. Total	%	Siemens-Halske. Total	%	Pollák Virág Total	%
Wires	57,600	50.8	38,400	47.9	38,400	37.9	21,600	27.6	21,600	24.9	21,600	24.1	43,200	39.3
Machines	7,500	6.7	8,416	9.7	29,000	28.7	10,700	13.7	11,640	13.4	14,490	16.1	14,040	12.4
Personnel	48,200	42.5	33,800	42.4	33,800	33.4	46,000	58.7	53,700	61.7	53,700	59.8	53,700	48.3
Totals	113,300	100	80,616	100	101,200	100	78,300	100	86,940	100	89,790	100	110,940	100

Note:—The Mercadier System uses different frequencies of the alternating current to obtain a number of circuits upon one wire, each of the receiving instruments being tuned to one of these frequencies. A considerable number of waves for each signal being necessary to affect the receiver, the high frequency of the current is objectionable. Because a number of currents of different kinds are superimposed, the adjustment necessary for any particular circuit is more difficult. If not operated in duplex, the capacity of the wire would be but half, and if operated in duplex a new balance would be necessary, with difficulties increasing disproportionately, as each additional circuit was added. If the faculty of immediate expansion of the carrying capacity of the wire is to be present, all the circuits must be kept in adjustment all the time.

In England and America, telegraph working of this kind has been mainly confined to the Morse quadruplex. The neutral side having proved commercially workable only under the best conditions, the use of the Morse quadruplex is waning in both countries. The Barclay System provides a single rapid transmission in each direction from previously perforated tapes.

Considering the practical difficulties with superimposed currents, the solution suggested by M. Hollós points to a multiplex system in which each one of a number of transmissions is given the sole use of an actual wire for a definite length of time. A review of the state of the art brings the conviction that the ordinary telegraph instruments cannot be used in this manner; that a greater amount of mechanism is required. If so, the systems now available present the most probable solution and their adoption may result from considerations of pressing importance.

The prevention of strikes, the expansion of the telegraphic traffic and the reduction of the telegraphic rates are the important subjects of present interest and are forcing into use systems that increase the carrying capacity of the wire and employ unskilled operators. For instance, the broad success of such an experiment as that now being tried in France, of sending letters at night at reduced rates, would seem to involve the use of machines having the highest possible multiplex capacity, using unskilled operators to send directly to automatic printing receivers.

Note to table No. 1.—There seems to be a miscalculation in regard to the number of operators required upon the Hughes, Baudot and Rowland apparatus; four Baudot quadruplex circuits require eight sending and eight receiving operators at each terminal, making thirty-two in all. Four Hughes duplex circuits will require four sending and four receiving operators at each terminal, making sixteen in all, and one Rowland octoplex circuit requires four sending and four receiving operators at each terminal, making sixteen in all.

Note to table No. 2.—These seems to be a discrepancy in the calculation of wages; either the wages for the eight operators upon the Hughes and Baudot should be raised or the wages for the eight operators on the Rowland should be lowered, since they are all paid at the same rate in the European service.

A Peculiar Telegraph Error.

A young man, now a resident of New York, but who came from a small town in the interior of the State, received a letter a short time ago from a young woman he knew in his home town, asking him to let her know a good hotel at which to stay over night in the city, as she was going to sail for Europe.

The letter came so close to the day of sailing that the young man decided it would be better to telegraph than to write a letter. He decided too that it would be best if the young woman put up at the Astor House, convenient to a morning sailing on the American Line.

So he sent her this despatch:

"You had better stop at Astor House."

When the operator up in the small country town was through transcribing the message it conveyed to the young woman the following illuminating advice:

"You had better stop at a storehouse."

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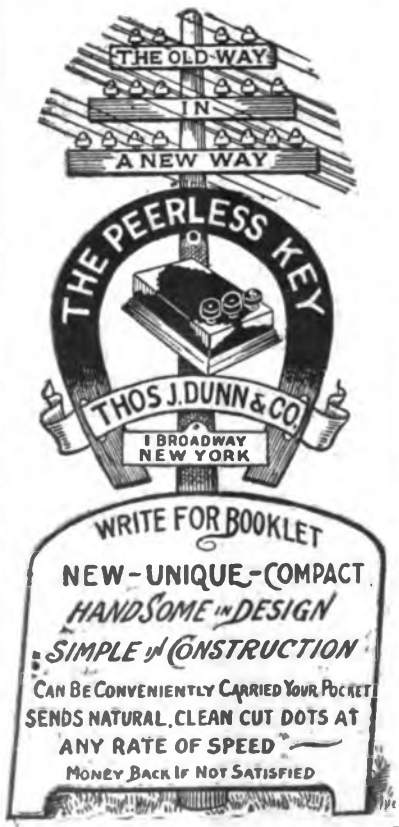

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JUNE 16, 1909.

The Detroit Convention.

The coming convention of the Association of Railway Telegraph Superintendents will be one of great importance if indeed it does not prove to be the most important convention ever held by the association. The subject of train despatching by telephone will, as it did at the Montreal convention of 1908, occupy a large part in the discussion, and is undoubtedly the most momentous question which concerns the superintendents at the present time, instituting as it does a complete revolution in the method of handling train orders. Adverse business conditions have no doubt retarded the development of this system, the great advantages of which were shown very clearly a year ago, but this delay has probably been of incalculable benefit to those who now contemplate the installation of the telephone to replace the telegraph by allowing them to profit by the extra year's experience of those who have already adopted the new system in part. Many of the superintendents, too, have taken the very commendable position that until they could provide a telephone system that would be so reliable as to preclude any possibility of the necessity of returning to the use of the telegraph they would not adopt the new method. By taking this stand they have materially aided in the final adoption of the telephone, as a few failures of poorly constructed systems to properly perform their work would convince doubting ones that the telephone was not a practical means for handling train orders, and it would take several years of successful operation to convince them otherwise.

That most of the superintendents appreciate the practicability and the possibilities of the telephone for their use is shown by the fact that several of the large railroad companies are adopting this new system as fast as the necessary equipment can be procured and installed. There are few who realize the importance of this movement from a business standpoint, but the following pertinent figures will give a fair idea of its magnitude. From personal inquiries which we have made of all of the railway telegraph superintendents in this country, Canada and Mexico, the detailed results of which will be found elsewhere in this issue, we find that there are at the present time about 12,000 miles of railroad on which the trains are despatched by telephone, or about three times the mileage which was thus operated a year ago. The indications are that this amount will be more than trebled during the coming year, as about fifty superintendents, representing over 150,000 miles of road, are contemplating the installation of the telephone, in part at least, to replace the telegraph. A fairly conservative estimate of the cost per mile of the wire, apparatus, etc., necessary to install a telephone-despatching circuit is $100. This means that the fifty railroad systems having this change in mind will have spent approximately $15,000,000 for this purpose before the change is completed. This estimate of the total expenditure has been confirmed by a prominent electrical engineer, who, by reason of several years' labor in this field of endeavor, is well qualified to predict what the future will bring forth.

There are still some who do not understand how the railroads can ever hope to reap any adequate returns from the expenditure of so much money for an improvement, the value of which is to them somewhat doubtful. We venture to predict that if those who hold this opinion will be present at the coming convention and hear of the results accomplished by the pioneers in this movement, who are all, so far as we have been able to learn, highly enthusiastic over its success, their doubts will give way to belief and they will join the ranks of those who look upon the telephone as more satisfactory and better adapted for handling train orders than the telegraph.

Railroads Test Labor Law.

A test case attacking the validity of the act of last year, limiting the hours of labor of telegraph operators and of railway employes, was docketed in the United States Supreme Court at Washington, May 14. It was brought by the Baltimore & Ohio Railroad Co. to enjoin the Interstate Commerce Commission from putting into effect its order requiring railroads to make reports of the hours of service of their employes, taking the ground that the order by the expense entailed in making the reports deprived them of property without due process of law and was violative of the rights of the railroad not to be compelled to give evidence against itself or be subjected to unreasonable search or seizure. The federal court in Maryland dismissed the bill and the railroad appealed.

Similar suits brought in other jurisdictions by the Pennsylvania, Philadelphia and Reading, Le-

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high Valley, Central of New Jersey, New York Central, Lackawanna, Erie, New York, Ontario and Western, New York, New Haven and Hartford roads are dependent upon the outcome of this case.

Rate Order of Oklahoma.

In the Supreme Court of Oklahoma on May 27 the Western Union Telegraph Company filed an appeal from the general rate order issued by the corporation commission of that state last December.

The order of which the company complains fixes the rates between points in the state under one hundred and seventy-five miles at thirty cents per ten-word message, and thirty-five cents for messages sent over two hundred miles, with a twenty-five cent night rate and two cents extra a word for day messages and one cent extra a word for night messages. The company alleges that its gross revenue last year from both interstate and intrastate business in Oklahoma amounted to $201,116.12, and their gross expenses $192,983.37.

The order of the commission was to have become effective on January 1, 1909, but owing to the fact that the company gave a $30,000 supersedeas bond to the corporation commission pending an appeal the old rates of twenty-five cents per message to points in the western part of the state and forty cents per message to most Indian Territory points, with a thirty-cent night rate, three cents extra per word on day messages and two cents at night, is still in effect. The telegraph company asks that the court reverse the order of the commission and fix rates not less than those now charged within the state.

The London Chamber of Commerce has received from the Postmaster-General of England a letter regarding the use of artificial code words after July 1, says the Electrical Review of London. The principal points in which the regulations relating to code have been altered are as follows: (1) An express stipulation has been inserted in order that there may be no doubt as to the condition which was previously implied, namely, that the standard of pronounceability to which artificial code words must conform is the current usage of the eight languages specified; (2) The administrations of Great Britain, France and Germany have been authorized to give the approval of the International Telegraph Union to such codes as are voluntarily submitted and are found upon examination to be prepared upon a proper basis.

Old Time and Military Telegraphers.

A special meeting of the executive committee of the Old Time Telegraphers and Historical Association was held at 195 Broadway, N. Y., on May 27. Among the out of town members present were Charles E. Bagley, of Philadelphia, vice-president of the association, and Harvey D. Reynolds, of Buffalo, who was president of the association last year. Others who voted to elect Mr. G. A. Cellar, whose election as president was briefly mentioned in our previous issue, were John C. Barclay, Belvidere Brooks, Charles C. Adams and Franklin J. Scherrer, all of New York, and W. J. Camp of Montreal.

The twenty-eighth annual reunion of the Old Timers, which takes place at the Fort Pitt Hotel, Pittsburg, Pa., on August 17, 18 and 19, in conjunction with that of the Society of the United States Military Telegraph Corps promises to be a most successful and well attended meeting, and the members of these two bodies may rest assured that they will be well repaid for any expenditure of time and inconvenience which they may undergo to attend this reunion. Any inquiries concerning the coming gathering will be answered by F. J. Scherrer, of 195 Broadway, New York, secretary of the Old Time Telegraphers' and Historical Association, or by David Homer Bates, 658 Broadway, New York, secretary of the Society of the United States Military Telegraph Corps.

The reception committee of the Society of the United States Military Telegraph Corps, which will have charge of the affairs of the society at the Pittsburg reunion, now consists of: Theo. E. Moreland, chairman, and Jos. W. Boyd, Pittsburg, Pa.; Geo. W. Baxter, Cleveland, O.; Frank Benner, Wilkinsburg, Pa., vice Thomas Armour, deceased; Daniel Colestock, Titusville, Pa.; J. W. Freeland, Marion, O.; Chas. W. Jaques, Ashtabula, O.; Major Jos. Orton Kerbey, Washington, D. C., vice Captain T. B. A. David, declined; Geo. A. Low, Sr., Wilkinsburg, Pa., and S. B. Rumsey, Oakmont, Pa.

The illustration which we present herewith shows the design for the official button which has been approved by the executive committee of the Society of the United States Military Telegraph Corps to be worn in the left-hand lapel of the coat. Those who are entitled to do so should be proud to wear one of these attractive buttons which may be obtained by addressing the secretary of the society, David Homer Bates.

Mr. W. J. Holton, formerly superintendent of telegraph of the Chicago and Western Indiana Railroad, but now cashier of the West Englewood Bank, Chicago, in renewing his subscription states:

"I could not keep house without Telegraph Age; it keeps me in touch with my old life."

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Reminiscences of the New York Associated Press.

BY EDWIN C. BOILEAU, OF PHILADELPHIA.

Prior to the year 1874, all of the New York Associated Press matter was handled by the telegraph companies and delivered by messengers, or sent through pneumatic tubes to the offices which were located conveniently to the telegraph office as was the case at New York, Philadelphia and Washington. The matter was there manifolded and distributed among the newspapers. This was rather a laborious operation and was the cause of considerable delay and annoyance.

At that time James W. Simonton and J. C. Hueston were respectively general manager and assistant general manager, the latter being a first class telegraph operator. Walter P. Phillips, who occupied the position of New York State editor, suggested the advisability of leasing a wire between New York and Washington and handling the business themselves, the receiving operators doing the manifolding.

Accordingly arrangements for the first leased wire were completed with the Western Union Telegraph Company and Mr. Phillips was delegated to secure the services of eight of the best telegraphers in the employ of that company.

He selected the following, one of each for day duty, and the other for night duty:

P. V. De Graw and E. C. Boileau, at New York; W. H. C. Hargrave and W. N. Gove, at Philadelphia; H. A. Wells and T. J. Bishop, at Baltimore, and W. G. Jones and F. N. Bassett at Washington. Mr. Jones was soon transferred to Philadelphia, however, as assistant manager of the office, and was succeeded by Thomas R. Taltavall.

The success of the first leased wire for handling press matter was assured from the beginning and the amount of business handled by these men was remarkable and at times phenomenal. This was undoubtedly the fastest circuit in the world; the operators being obliged to take never less than fourteen copies with a stylus, and this with the very fastest senders in the country doing the transmitting. It was strenuous work and had the effect of causing writers' paralysis among several of the men.

The adoption of the Phillips register (or monkey, as it was called,) in 1877 relieved the operators considerably. This was a system by which press matter was transmitted in the Phillips code, in "takes" of 150 words each, and registered at the receiving points on a narrow slip of paper, in Morse characters. This matter was then deciphered, manifolded and distributed to the newspapers.

In this connection the work of Samuel H. Jones of the Philadelphia office staff was a remarkable feature. Mr. Jones, although not an operator, and who could not distinguish a dot from a dash on the sounder, was able to read from the narrow slip and copy on manifold, more rapidly than the most expert operator. Mr. Jones held the position of Night Manager of the Associated Press in the Quaker City until about two years ago, when he resigned in order to devote his attention to his interest in the Philadelphia American League Baseball Club, of which he is part owner.

The service rendered by Edwin M. Hood, of the Washington Associated Press office, in translating from the "monkey" compared favorably with that of Mr. Jones. Although not an operator he could transcribe with a rapidity that was little short of miraculous. Mr. Hood at present is assistant superintendent of the Southern division of the Associated Press at Washington.

In 1882-3 the press matter became so heavy that the Western Union facilities were frequently used as an overflow. This, however, proved very unsatisfactory and expensive and resulted in the institution of the quadruplex. An increase in the operating force at each point was necessary. L. B. McCarthy, W. T. Loper and others were added to the New York end, and J. T. Wilde, an expert on quads, together with C. Latta Laverty, C. H. McCullough and Ernest W. Emery were added to the Philadelphia force, the latter of whom is still with the Associated Press at Washington in an official capacity.

Among other prominent telegraphers who did yeoman service on the leased circuit in Washington was Robert H. Prender, who now so efficiently fills the important position of Chief Clerk in the Bureau of the Fourth Assistant Postmaster-General.

Other operators were taken on to fill the places made vacant by promotions, prominent among whom was Joseph Christie, who was a voluminous writer for various telegraph periodicals and books, all of which can be found in the library of Telegraph Age.

William A. Connor, who joined the Associated Press force at Philadelphia in the early eighties, was one of the best operators in the service. Mr. Connor at present occupies the position of Philadelphia Manager of the Associated Press, acquired by his untiring energy and exceptional ability.

About 1880 a leased wire service was established throughout Pennsylvania furnishing reports to a large number of papers, including those at Harrisburg, Reading, Lancaster, Altoona, Johnstown, Pottsville and others, and I. D. Maize did the transmitting at Philadelphia. At the telegraph tournament held in Philadelphia in 1903, Mr. Maize won first prize in the Old Timers' Class.

About the year 1882 typewriters were introduced and the work, which had been so irksome with the stylus, became more of a pleasure to the receivers. The speed was increased by the use of the Phillips code, in which all the operators became very expert and the volume of press matter handled was enormous.

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In the year 1883 The United Press was organized and Mr. Walter P. Phillips was made general manager. The new news-gathering association grew rapidly and made a vigorous fight against the New York Associated Press, finally absorbing the latter in 1892.

The western contingent of the Associated Press, however, under the leadership of Mr. Melville E. Stone, reorganized The Associated Press and renewed the war with The United Press, the result of which was that after more than four years of bitter rivalry, The United Press was compelled to yield the field of operations to the co-operative plan inaugurated, and which has since been operated by The Associated Press.

Of the original eight leased wire men, W. H. C. Hargrave, W. G. Jones, and W. N. Gove have gone the long voyage. P. V. De Graw, who obtained great popularity among the newspaper fraternity and high officials in Washington, now holds the position of fourth Assistant Postmaster-General. E. C. Boileau is with a grain firm in Philadelphia. H. A. Wells is manager of the Associated Press at Buffalo, N. Y. F. N. Bassett is in commercial business at Boston, and T. J. Bishop is with the United Press Association, successor to the Scripps-McRae Press Association in Baltimore.

One Cause of Nervous Breakdown.

According to a writer in the London Telegraph Chronicle the following reasons are assigned for the breakdown of so many telegraphers in that and other countries:

"Physical deterioration of telegraphers and abnormal sick leaves in England have become so serious as to provoke alarmed attention. Specific maladies and their causes have been discussed, but one important aggravating cause of ill-health, discomfort and resultant inefficiency of the telegraphers has been overlooked.

"It has always been recognized that groups of figures and groups of letters not forming words were difficult to transmit. The rules for counting and charging them had the effect and probably were designed to have the effect of keeping groups of figures or letters down to small dimensions so that they could be dealt with by the telegraphers with reasonable facility and comfort.

"Figures are counted five to the word. Letters are counted five to the word, but the Telegraph Conference of 1903 held at London extended the meaning of "code word" to embrace expressions of ten letters provided the syllables were pronounceable. The effect of the extension has been to create ten-letter word expressions which no human being can deal with except under strain and discomfort.

"Here are a few examples of the expressions of which foreign telegrams are composed: 'dyfguixeho,' 'pyvifpegach,' 'ayeugdadpy,' 'icvibbojev,' 'ejiszgwery,' 'ahnyxotgu,' 'xusnyocip,' 'ouipipehcj.' The mere reading of these expressions is a severe strain on the eye, and the manipulation of the telegraph key in producing such unusual sequences of telegraph signals is tiring to the hand and arm of the sending operator. At the distant end the work of the receiving operator in receiving the unusual sequences of telegraph signals and reducing them to the uncouth-looking expressions in script is most wearisome. The ear, the eye and mind are subjected to intolerable strain. Impairment of bodily and mental health necessarily results, and the period of usefulness of the telegrapher is shortened.

"So long ago as February, 1904, the Postmaster-General issued a warning that these expressions are difficult of transmission and, that there was danger of the privilege of using them being curtailed. Senders of telegrams pay no attention to this, but go on using more and more grotesque expressions.

"It is time for the Telegraph Department to interfere for the preservation of the eyes and nerves of its servants.

"It is as difficult to transmit groups of ten letters like those mentioned as it is to transmit groups of ten figures. The Telegraph Department does not allow more than five figures to a group, and should not allow the indiscriminate assembling of more than five letters in a group."

The Quadruplex.

"The Quadruplex," by Maver and Davis, is doubtless the most thoroughly practical low-priced work treating on this subject ever published.

It is clear and lucid in its style, a text-book free of all technicalities and easily comprehended. It contains 128 large pages, is copiously illustrated, bound in cloth and well printed on heavy paper.

It embraces just the ideas that should find a place in every telegraph office, and no telegrapher who desires to acquire a complete knowledge of multiplex telegraphy, the perfect understanding of which is so essential in these days, should fail to promptly obtain a copy of this important book.

Its chapters include: Development of the Quadruplex; Introduction and Explanation; The Transmitter, Rheostat and Condenser; Stearns Duplex; Instruments of the Polar Duplex; The Polar Duplex; The Quadruplex; The Dynamo-Electric Machine in Relation to the Quadruplex; The Practical Working of the Quadruplex; Telegraph Repeaters; The Wheatstone Automatic Telegraph.

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

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THE RAILWAY TELEGRAPH SUPERINTENDENTS MEET IN CONVENTION.

Only a small part of the traveling public ever stops to think of the measures which are taken by railroad companies to insure their safety when riding swiftly across the country on a limited express, still fewer of them know anything about the superintendent of telegraph and the part which he plays in the great system which has been developed to safeguard their physical welfare while traveling, and the number of those who know anything about the annual meetings of the railway telegraph superintendents, held to discuss

WILLIAM J. CAMP, OF MONTREAL, QUE.
President of the Association of Railway Telegraph Superintendents.

faults in this system and ways of improving it, is comparatively very small indeed. For it must be confessed that the systems in use to-day for directing train movements have their weak points. If they were perfect there would be no accidents due to failure of the trainmen to get the right orders or delays to trains in waiting for orders. As, however, these things do occur occasionally, it must be admitted that there are features of the systems that are susceptible of improvement. The telegraph superintendents throughout the country, realizing this and fully alive to the fact that many minds can solve these problems, which are arising constantly, easier than a single one, meet annually to discuss with one another any points of interest which concern the safe, efficient and economical operation of the systems over which they have charge.

The twenty-eighth annual convention of the Association of Railway Telegraph Superintendents, which meets in Detroit, June 23, 24 and 25, will be confronted by numerous important and complex problems for its consideration, in spite of the many improvements which have been introduced as a result of the discussions and investigations which have been carried on since the formation of the association at Chicago in 1882.

The telegraph, coming into general use at about the same time that the railroads were being rapidly extended throughout the country, naturally adapted itself for directing all train movements from some central point, and thus avoiding delays and possible accident incident to the movement of trains without some swift means of communication between the different stations along the line. As improvements in rolling stock and track were introduced, allowing greater speed of trains, and the traffic of railroads increased, the accurate and reliable operation of the telegraph systems became more and more important, and greater interest was taken in establishing a means of communicating orders to train crews which should be swift, convenient and trustworthy, and which could be depended upon at all seasons of the year and under any condition of the weather.

The Association of Railway Telegraph Superintendents was formed by the men having the telegraph systems of the railroads in this country under their jurisdiction in 1882, and it is only giving the association its just dues to say that no other agency has been as instrumental in improving the conditions under which train movements are directed as have the discussions at its annual conventions. The aim has always been to provide

J. B. FISHER, OF PHILADELPHIA.
Vice-President of the Association of Railway Telegraph Superintendents.

the most reliable system possible and at the same time to keep the expenditure required to maintain and operate that system within reasonable limits.

The coming convention, which is the third in the series held at Detroit, promises to be one of the most interesting ever held by the association on account of the rapid development in the use of the telephone for train despatching purposes. At the meeting of a year ago in Montreal the use of the telephone entered into the discussion, but up to that time it had not had a general enough

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use under varying conditions to give the superintendents a sound basis for judging the value of the new system as a possible successor of the telegraph. At the present time, however, the telephone has had a wide enough application upon several of the leading railway systems of the country to show conclusively to the most skeptical its value in performing better the work which the telegraph has been doing for many years.

The telephone systems installed up to the present time, of course, have some features which those in charge of them recognize may be improved, and the experiences of those who have had these systems under their personal supervision for a year or more should prove most valuable to any who contemplate adopting the new method of train despatching.

P. W. DREW, OF CHICAGO, ILL.
Secretary and Treasurer of the Association of Railway Superintendents.

The general adoption of the telephone by the railroads will introduce many new conditions for the consideration of the telegraph superintendents in regard to batteries, line construction, types of apparatus, etc., and the conventions of the Railway Telegraph Superintendents will have as many interesting problems presented for their discussion in the future as they have had in the past.

The headquarters of the convention will be at the Hotel Ponchartrain, which is on the site of the old Russell House, immediately opposite the City Hall. This new hotel, one of the most luxurious in the country, is thus situated at the business center of Detroit, and is easily reached, the street car lines from every steamboat dock and railroad station passing its door, and nearly every interurban line entering Detroit running through Griswold street, which is only two hundred feet distant. There are three hundred bedrooms in this hotel, which is conducted upon the European plan, and all but sixty of them communicate with their own private bath. The rates for rooms are as follows: Room for one person with running water, $2 to $2.50, with bath, $3 to $5; room for two persons with running water, $3 to $4, with bath, $5 to $8; rooms on parlor floor suitable for exhibition purposes for supply men, $8 to $20 per day. Reservations may be obtained upon application to the hotel managers, Messrs. Wooley and Chittenden.

It is expected that members, as is customary, will provide themselves with railway transportation through the usual channels.

The Pullman Company advise, "We will, as in the past, take pleasure in extending to delegates and dependent members of their families, the usual courtesy, namely: Delegates to pay full fare en route to Detroit, and on presentation of receipts showing fare paid, together with proper credentials of the association, also a letter from the proper official of the railroad with which each delegate is connected, identifying them as regular salaried employes in active service and who fall within the limitations of the Interstate Commerce law, to our Mr. C. J. Segar, district superintendent, Detroit, passes will be issued for the return trip."

HOTEL PONTCHARTRAIN, DETROIT, MICH.
Headquarters of Convention of Association of Railway Telegraph Superintendents.

The committee of arrangements, which has charge of all matters pertaining to the entertainment of the visiting superintendents, is composed of: E. H. Millington, Detroit, superintendent of telegraph of the Michigan Central Railway, chairman; William Marshall, of the Canadian Pacific Railway's Telegraph, Toronto; G. C. Kinsman, superintendent of telegraph of the Wabash Railroad, Decatur, Ill.; W. W. Ashald, superintendent of telegraph of the Grand Trunk Railway, Montreal, and William Kline, superintendent of telegraph of the Lake Shore and Michigan Southern, Toledo, Ohio.

The ladies' committee which is arranging for the reception and special entertainment of the ladies who visit Detroit is made up of the wives of the members of the committee of arrangements.

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While it is business primarily that calls the superintendents together the committee of arrangements have decided that Friday, June 25, be given over to a trip to Port Huron and return, the Grand Trunk Railroad Company having kindly offered to place extra equipment on their train leaving Detroit at 10.45 a. m. Lunch will be had at Port Huron or Sarnia, and the party will be given an opportunity to inspect the tunnel under the St. Clair river at that point, which a few months ago was changed over to electrical operation. At 3.45 p. m. the party will leave Port Huron by the magnificent steamer Tashmoo for a trip down the St. Clair River, through the Flats, the Venice of America, across Lake St. Clair and down the Detroit River, arriving at Detroit at 8.30 p. m. This will be a most delightful outing and the trip on the steamer should prove especially enjoyable. In addition to this other plans have been arranged to provide for the entertainment of the visiting ladies during the business hours of the convention.

The executive committee announces, in accordance with Article VII. of the constitution, amendments to the constitution as per printed copies which have been furnished each member. Discussions and recommendations of same have also been furnished in the minutes of meetings of the Eastern and Western divisions.

The committee on topics consisting of John L. Davis, of Chicago, superintendent of telegraph of the Chicago and Eastern Illinois, chairman, and Percy Hewett, superintendent of telegraph of the Sunset Lines in Texas and Louisiana, Houston, Texas, has arranged a most attractive and interesting program consisting of the following papers:

J. G. Jennings, of Chicago, superintendent of telegraph of the Chicago, Rock Island and Pacific, will present a paper on "The Necessity for Censoring Railroad Telegrams." This will be discussed by F. E. Bentley of the St. Louis Terminal Railroad, St. Louis, and S. K. Bullard of the Missouri, Kansas and Texas, Denison, Tex. "The Difference Between the Trouble Shooter and a Division Lineman" will be outlined by H. D. Teed of St. Louis, superintendent of telegraph of the St. Louis and San Francisco Railroad. W. P. Cline of the Atlantic Coast Line, Wilmington, N. C., will lead the discussion of this paper. S. L. Van Akin, assistant superintendent of telegraph of the New York Central, Syracuse, N. Y., will tell of "The Advantages or Disadvantages of Using Cable in Bringing Telephone and Telegraph Wires into Local Offices." G. H. Groce, of the Illinois Central, Chicago, will lead the discussion, and he will be followed by I. T. Dyer of the San Pedro, Los Angeles and Salt Lake Railroad, Los Angeles.

"Efficient Office Organization" will be the subject presented by E. H. Millington of Detroit, superintendent of telegraph of the Michigan Central. J. B. Sheldon of the Union Pacific, Omaha, and B. F. Frobes of the Oregon Short Line, Salt Lake City, will discuss Mr. Millington's paper. The subject of "Telephone Construction" will be presented by J. C. Kelsey. F. H. Van Etten of the Southern Indiana, Chicago, and R. L. Logan of the Kansas City Southern, Kansas City, will discuss Mr. Kelsey's views from the railroad standpoint. E. J. Little of St. Paul, superintendent of telegraph of the Great Northern, will tell of the "Benefits of Standards in Telegraph and Telephone Construction." His paper will be discussed by G. C. Kinsman of the Wabash, Decatur, Ill., and F. S. Spaford of the Chicago, Rock Island and Pacific, Chicago.

F. H. Loveridge will speak on "Dry Batteries," and C. J. Fry of the Chicago, Milwaukee and St. Paul, Milwaukee, and W. C. Walstrum of the Norfolk and Western, Roanoke, Va., will take part in the discussion. William Maver, Jr., of New York, the electrical engineer and well-known authority on the subject, will present a paper on "Wireless Telegraphy." C. S. Rhoads of the Cleveland, Cincinnati, Chicago and St. Louis, Indianapolis, and F. G. Sherman, of the Central Railroad of New Jersey, New York, will open the discussion.

"Wire Testing and the Care of Wires" will be presented by V. T. Kissinger of Lincoln, Neb., assistant superintendent of telegraph of the Burlington system. W. F. Williams of the Seaboard Air Line, Portsmouth, Va., and W. P. McFarlane of the Chicago and Northwestern, Omaha, will discuss Mr. Kissinger's paper. The question of "Pole Preservation" will be discussed by H. P. Folsom.

HISTORY OF THE ASSOCIATION.

It may be of interest to many to trace in brief the history of this organization from its inception at Chicago, November 20, 1882. At this first meeting the officers elected were: W. K. Morley, president; William Kline, vice-president, and C. S. Jones, secretary and treasurer.

At the second meeting also held in Chicago, June 13 and 14, 1883, the interest in the new organization was shown by the fact that there were thirty railroads represented. Mr. Morley was again elected president; Charles Selden, vice-president, and P. W. Drew, secretary and treasurer. Mr. Drew has filled this position with credit to himself and the association ever since that time being re-elected at each recurring meeting of the association. At the third meeting held September 17, 1884, Charles Selden was elevated to the presidency, and E. C. Bradley was elected vice-president. The fourth meeting at Cleveland, O., June 17 and 18, 1885, chose C. W. Hammond to succeed Mr. Selden, and elected as vice-president, George L. Lang.

The dates of the fifth meeting, which was held in St. Paul, were June 16, 17 and 18, 1886. At this meeting thirty-four railroads were represented, and the social feature of these conventions came into prominence, the guests being entertained by an excursion to Duluth and the

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Apostle Islands by rail and boat. A R. Swift was elected president, and George L. Lang was re-elected vice-president.

The East claimed the sixth convention, which was held at Boston, July 13 and 14, 1887. It was at this meeting that the practice of showing exhibits of telegraphic and other electrical devices was first introduced. George L. Lang was here elevated to the presidency, and G. C. Kinsman was elected vice-president.

New York was the scene of the seventh meeting which met July 11, 1888. Edison's phonoplex system was shown in operation at this time and Mr. Kinsman was made president, C. A. Darlton succeeding him as vice-president.

Washington, D. C., entertained the eighth annual convention, which met October 16, and 17, 1889. Benjamin Harrison, who was then president, received the members of the convention in the White House. C. A. Darlton being elected to the presidency, George T. Williams was elected vice-president to succeed him.

The ninth annual gathering assembled at Niagara Falls, June 18 and 19, 1890. This convention was notable for the large number of papers read and the exhibition of the long distance telephone by which conversation was held with parties in Albany and New York. George T. Williams was elected to the presidency and George M. Dugan was elected vice-president.

At the tenth annual convention held at Cincinnati, Ohio, June 17 and 18, 1891, the number of railroads represented had increased to thirty-seven. This meeting elected C. S. Jones as president and L. H. Korty, vice-president.

The eleventh in the series of conventions assembled at Denver, June 15 and 16, 1892. This meeting was largely attended, and was made notable by a paper by Thomas A. Edison. L. H. Korty being advanced to the presidency, U. J. Fry was elected to succeed him as vice-president.

The twelfth on the list convened at Milwaukee, June 20 and 21, 1893. The World's Fair at Chicago being then in progress most of the members included a visit to this great exposition in their convention trip. U. J. Fry was elected president and O. C. Greene, vice-president.

On June 13 and 14, 1894, the thirteenth annual convention met at Detroit. That the superintendents are not superstitious seems to be proved by the fact that the coming convention is the second one to meet in Detroit since the thirteenth. Following the usual custom at this convention, O. C. Greene was made president, and E. R. Adams was elected vice-president.

At the fourteenth annual convention held in Montreal, June 12, 1895, M. B. Leonard was elected president, and J. W. Fortune, vice-president.

Old Point Comfort, Va., was the scene of the fifteenth convention which met June 17 and 18, 1896. Among other papers presented at this meeting was one by W. W. Ryder upon "The Telephone in Railway Practice." G. M. Dugan was elected president and J. W. Lattig, vice-president.

For the second time Niagara Falls was chosen as the place of gathering, the sixteenth annual convention meeting there June 16, 1897. J. W. Lattig being made president, W. W. Ryder was elected vice-president.

The most notable feature of the seventeenth annual convention which met June 15, 1898, at Omaha, Neb., was the report of a special committee upon low resistance relay experiments. W. W. Ryder was elected president, and L. B. Foley, vice-president.

For a meeting place for the eighteenth annual convention the superintendents turned toward the South, gathering at Wilmington, N. C., May 17 and 18, 1899. L. B. Foley, being elected to the presidency, W. F. Williams succeeded him as vice-president.

Detroit was then for the second time chosen as the convention city, the nineteenth annual convention meeting there June 20, 21 and 22, 1900. W. F. Williams was naturally elected to the presidency, and C. F. Annett was elected vice-president.

Buffalo was the scene of the twentieth annual convention which met in that city, June 19, 20 and 21, 1901. C. F. Annett, being made president, F. P. Valentine was elected vice-president. This being the year of the Pan-American Exposition, an unusually large number were in attendance at this meeting.

For the third time Chicago became the scene of the convention, the twenty-first annual meeting being held there June 18, 19 and 20, 1902. Among the important subjects which came up for discussion at this convention were the questions of typewritten train orders and the use of the telephone in connection with railroad operation. J. H. Jacoby was elected president and W. J. Holton, vice-president.

The far South claimed the twenty-second annual convention, which met in New Orleans, May 13, 14 and 15, 1903. The use of the telephone in connection with railway work again took a large part in the discussion. Mr. F. F. Fowle, of the engineering department of the American Telephone and Telegraph Company, presenting a lengthy illustrated paper upon "The Transposition of Telephone Lines to Prevent Cross Talk and Induction." At this time C. S. Rhoads was honored with the presidency and C. P. Adams became vice-president.

Indianapolis was the scene of the twenty-third convention in the series, which met in that city June 15 and 16, 1904. After the adjournment a side trip was made to the St. Louis Exposition. Henry C. Hope was elected president at this time and E. E. Torrey, vice-president.

The twenty-fourth annual convention met at Chattanooga, Tenn., May 17 and 18, 1905. The increasing use of high-tension transmission made

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very timely the paper of W. J. Camp upon "High Tension Wires on Railway Right of Way," which he presented at this meeting. E. E. Torrey was advanced to the presidency, and E. A. Chenery was elected vice-president.

The superintendents again turned their faces toward Denver, the twenty-fifth annual convention meeting there June 20 and 21, 1906. The question of high-tension wires again came up and occupied a large place in the discussion. E. A. Chenery was elected to the presidency and E. P. Griffith was elected vice-president.

Atlantic City, N. J., the popular waterside resort, entertained the twenty-sixth annual convention, which met June 19, 20 and 21, 1907. An unusually large number of interesting papers were read at this meeting, and some most interesting discussions developed. E. P. Griffith was advanced to the presidency and W. J. Camp succeeded him as vice-president.

The twenty-seventh annual convention, which met in Montreal, June 24, 25 and 26, 1908, is too fresh in the minds of the superintendents to require any special comment. W. J. Camp was elected president and G. W. Dailey, vice-president. Upon Mr. Daily's promotion from the position of telegraph superintendent of the Chicago and Northwestern to the superintendency of the Wisconsin division of that road, J. B. Fisher was elected by the executive committee as vice-president.

SOMETHING ABOUT DETROIT.

Detroit, the metropolis of Michigan, is situated upon the American side of the river of the same name, which connects Lake Erie and Lake St. Clair, and which at this point is half a mile wide and affords a splendid harbor, with a waterfront of about nine miles. The river, which is so called from the French word meaning strait and which has sometimes been termed the Dardanelles of the New World, contains many beautiful little islands, which, together with those on Lake St. Clair, are popular as places of summer residence and as resorts. One of the largest of these, Belle Isle, which covers over 700 acres of ground, has, at an expense of several million dollars, been converted into Detroit's finest park, and being connected with the city by a bridge over a half mile in length, is easily reached by car lines from the center of the city. The beauty of the river location of this park is supplemented by a series of interior lakes and canals, which extend around the island.

With a population estimated at nearly 400,000, Detroit covers an area of thirty-six square miles, and has a reputation for broad, clean and well-paved streets. Of these the most notable are the avenues stretching out radially in different directions from the center of the city and which are from one hundred and fifty to two hundred feet wide.

Situated as it is upon the great interior waterway, and being the point to which all of the principal railway lines of Michigan converge, Detroit is an active commercial and industrial center and ranks first among the northern border ports of the United States in the extent of its foreign trade.

The original settlement where this progressive and up-to-date city now stands was called Fort Pontchartrain, and was established in 1701 by Cadillac, the first French governor of the territory in that vicinity. Within a stone's throw of the point where Cadillac landed with his expedition of twenty-five birch bark canoes from Quebec over two hundred years ago, there is today a great public square commemorating his name, and the convention hotel, named in honor of the sponsor of Cadillac, who started him on his history-making expedition, fronts upon this square. Detroit was a strategic point in the many Indian and border warfares which harassed the country during the first century of its existence. Its last participation in this connection was in the war of 1812, when it was surrendered to the English by Governor Hull without any resistance, but was, after a short occupation, abandoned by them.

Being situated on ground rising from the river bank, a magnificent panorama of river, lake, islands and the Canadian shores is spread out to the view of the observer from any of the higher buildings; in fact, the convention visitor, if he has a room above the fifth floor of his hotel, may behold this view from his window.

The public buildings of Detroit, notable among which are the city hall, county court house, post office, Masonic Temple, federal building and Chamber of Commerce, are of modern, and up-to-date architecture, the banking houses of Griswold street comparing favorably with those of New York City. The visitor in Detroit will have ample sights of interest to occupy his attention while there, and will undoubtedly carry away pleasant memories.

OFFICERS FOR 1908-1909.

William J. Camp, president, Montreal, Que.; J. B. Fisher, vice-president, Philadelphia, Pa.; P. W. Drew, secretary and treasurer, Chicago, Ill.

LIST OF ACTIVE MEMBERS.

Name.	Railroad.	Address.
W. W. Ashald,	G. T.,	Montreal, Que.
B. B. Baughman,	W. & L. E.,	Canton, O.
H. L. Bennett,	H. & T. C.,	Houston, Tex.
William Bennett,	C. & N. W.,	Chicago, Ill.
F. E. Bentley,	T. R. R. Assn.,	St. Louis, Mo.
E. R. Bonnell,	C., C., C. & St. L.,	Indianapolis.
George Boyce,	C., St. P., M. & O.,	St. Paul, Minn.
F. G. Boyer,	N. T. Co.,	Oil City, Pa.
J. H. Brennan,	St. L. & S. F.,	St. Louis, Mo.
F. M. Brown,	P. & L. E.,	Pittsburg.
J. C. Browne,	Mo. Pac.,	St. Louis, Mo.
S. K. Bullard,	M. K. & T.,	Denison, Tex.
W. J. Camp,	Can. Pacific,	Montreal, Que.
G. A. Cellar,	Pa. Lines W. of P.,	Pittsburg, Pa.

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E. A. Chenery, Mo. Pac., St. Louis, Mo.
J. P. Church, Wabash, Decatur, Ill.
W. P. Cline, A. C. Line, Wilmington, N. C.
W. L. Connelly, C. I. & S., Gibson, Ind.
J. L. Davis, C. & E. I., Chicago, Ill.
E. W. Day, B. & O., Baltimore, Md.
E. E. Dildine, Nor. Pacific, St. Paul, Minn.
G. A. Dornberg, Pa. Lines W. of P., Pittsburg.
P. W. Drew, M., St. P. & S. S. M., Chicago, Ill.
I. T. Dyer, S. P. L. A. & S. L., Los Angeles, Cal.
J. B. Fisher, Pennsylvania, Philadelphia, Pa.
L. B. Foley, D., L. & W., New York.
A. S. Foote, Sunset Lines, Houston, Tex.
S. A. D. Forristall, B. & M., Boston, Mass.
B. F. Frobes, O. S. L., Salt Lake City, Utah.
U. J. Fry, C., M. & St. P., Milwaukee, Wis.
C. H. Gaunt, A. T. & S. F., Topeka, Kan.
T. R. Gooch, R. F. & P., Richmond, Va.
O. C. Greene, Nor. Pac., St. Paul, Minn.
E. P. Griffith, Erie, Jersey City, N. J.
G. H. Groce, Ill. Central, Chicago, Ill.
J. G. Hampton, No. Amn. T. Co., Deseronto, Ont.
A. Hatton, C. P., Winnipeg, Man.
J. L. Henritzy, C. & S., Denver, Col.
Percy Hewett, Sunset Lines, Houston, Tex.
Otto Holstein, C. de P., Cerro de Pasco, Peru.
F. T. Jennings, C. P., North Bay, Ont.
J. G. Jennings, C., R. I. & P., Chicago, Ill.
W. M. Johnson, Jr., B. & L. E., Greenville, Pa.
L. M. Jones, A. T. & S. F., Topeka, Kan.
G. C. Kinsman, Wabash, Decatur, Ill.
V. T. Kissinger, C. B. & Q., Lincoln, Neb.
Wm. Kline, L. S. & M. S., Toledo, O.
E. A. Klippel, O. R. & N., Portland, Ore.
C. L. Lathrop, P. S. & N., Angelica, N. Y.
C. M. Lewis, P. & R., Reading, Pa.
E. J. Little, Gt. Nor., St. Paul, Minn.
R. L. Logan, K. C. Sou., Kansas City, Mo.
E. E. McClintock, C. & W., Denver, Colo.
G. B. McCoy, Y. & M. V., Greenville, Miss.
W. P. McFarlane, C. & N. W., Omaha, Neb.
M. Magiff, Cent. Vt., St. Albans, Vt.
M. W. Maguire, N. & S., Norfolk, Va.
W. Marshall, C. P., Toronto, Ont.
W. S. Melton, Q. & C., Lexington, Ky.
C. W. L. Mickley, I. & G. N., Palestine, Tex.
R. W. Mitchener, N. Y. C. & St. L., Cleveland, O.
E. H. Millington, M. C., Detroit, Mich.
J. L. Orbison, C. H. & D., Cincinnati, O.
C. A. Parker, D., N. W. & P., Denver, Colo.
E. A. Patterson, C., M. & St. P., Milwaukee, Wis.
C. P. Phelps, L. & N., Louisville, Ky.
W. H. Potter, Southern, Washington, D. C.
F. S. Rawlings, So. Pac., San Francisco, Cal.
Geo. Reith, Virginian, Norfolk, Va.
C. S. Rhoads, C., C., C. & St. L., Indianapolis, Ind.
Thos. Rodger, G. T., Montreal, Que.
Geo. Rooke, C. P., Montreal, Que.
W. W. Ryder, C., B. & Q., Chicago, Ill.
Charles Selden, B. & O., Baltimore, Md.
J. B. Sheldon, Union Pac., Omaha, Neb.
F. G. Sherman, C. R. R. of N. J., New York.
C. F. Smith, C. & A., Bloomington, Ill.
N. E. Smith, N. Y., N. H. & H., New Haven.
F. W. Smith, B. & L. E., Greenville, Pa.
F. S. Spafard, C., R. I. & P., Chicago, Ill.
J. S. Stevens, C. & O., Richmond, Va.
A. B. Taylor, N. Y. C. & H. R., New York.
H. D. Teed, St. L. & S. F., St. Louis, Mo.
G. C. Todd, N. Y. C. & St. L., Cleveland, O.
E. E. Torrey, M. & O., Jackson, Tenn.
Frank Tremble, T. & P., Dallas, Tex.
H. A. Tuttle, M., St. P. & S. S. M., Minneapolis.
S. L. Van Akin, N. Y. C. & H. R., Syracuse, N. Y.
F. H. Van Etten, So. Ind., Chicago, Ill.
J. M. Walker, D. & R. G., Denver, Colo.
W. C. Walstrum, N. & W., Roanoke, Va.
B. Weeks, Ill. Cent., Memphis, Tenn.
L. S. Wells, Long Island, Long Island City, N. Y.
F. T. Wilbur, Ill. Cent., Chicago, Ill.
W. F. Williams, S. A. Line, Portsmouth, Va.
R. N. Young, C. P., Winnipeg, Man.

EXHIBITS AND REPRESENTATIVES AT THE CONVENTION.

The J. H. Bunnell and Company, Incorporated, of New York, manufacturers of electrical and telegraph supplies, will be represented by its president, Mr. John J. Ghegan, who is a familiar figure at the annual gatherings of the association.

The Okonite Company will be represented by Mr. John Langan of the New York office.

The Stromberg Carlson Telephone Manufacturing Company, of Rochester, N. Y., will occupy parlor "J." The company will be represented by Mr. E. C. Lewis, of their Chicago office; Mr. J. O. Oliver, of Philadelphia, and Messrs. C. E. Hague, E. O. Munson and J. S. Gibson, of the Rochester office. This year they will display for the first time their improved selective alarm telephone despatching apparatus, which is now the equipment manufactured by this company. Since last June they have acquired the exclusive manufacturing and selling rights for this equipment, both for steam and electric interurban railway systems that use this kind of apparatus and have redesigned many of its parts.

The principal new features are a change in the master station selector, doing away with the pin for selecting the numbered stations, which has been supplemented by a design whereby buttons are pressed corresponding to the station to be called. Successive selection of stations and a more rapid time interval has also been created by the changes which have been made in the design of this apparatus. Several improvements have also been made in the mechanical design of these instruments. The Delaware, Lackawanna and Western Railroad are operating this system on their Bloomsburg Division from Scranton to Northumberland with considerable success. A complete line of magneto telephones of several types for use on trains and for local stations will also be shown.

(Continued on page 433.)

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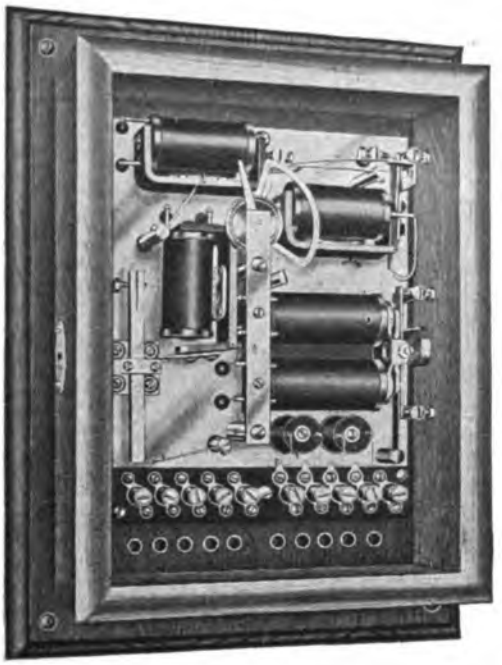
THE SANDWICH SELECTOR



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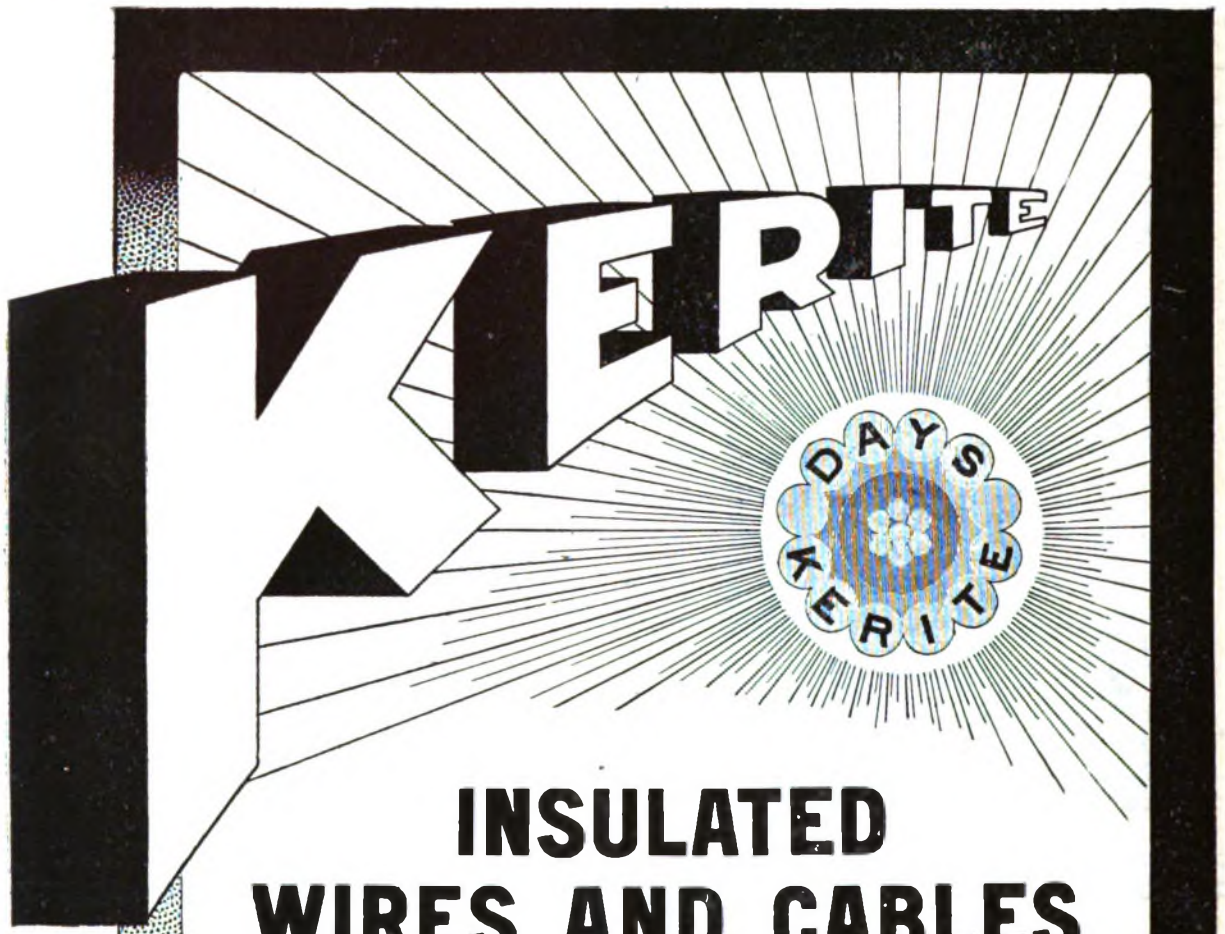

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STATISTICAL INFORMATION REGARDING THE USE OF THE TELEPHONE.

Acting upon the suggestion of several of our friends who are interested in the extension of the telephone for train-despatching purposes, Telegraph Age began some time ago the collection of statistics to show the extent to which the telephone had already superseded the telegraph for railway purposes and also the personal opinions of those intimately concerned with this new method of handling train orders. Having this object in view, a printed slip was prepared containing several questions, in this connection, about which information was desired and which would be interesting to all concerned. These slips were sent to every railway telegraph superintendent in the United States, Mexico and Canada, together with a personal letter explaining in detail our object in asking for the answers to the questions. The response to this appeal was most gratifying, showing the great interest felt concerning this subject throughout the country and confirming us in our belief that this information would be appreciated by many. Replies have been received from every telegraph superintendent connected with the important railway systems, and as a result we take pleasure in presenting herewith a statistical table, which contains the most complete and authentic figures which have as yet been set forth showing the extent to which train movements are now directed by the use of the telephone. We also present following the table much detailed information from the different superintendents, telling what they are doing in regard to adopting the telephone, and their personal opinions of the value of the new system.

Name of System:	Supt. of Telegraph.	Total Mileage.	Number of Miles on which Trains are Despatched by Telephone. (a) Single Track.	(b) Double Track.	No. of Miles on which Trains are Despatched by Telegraph.	Is an extension of the telephone system contemplated?
Atchison, Topeka and Santa Fe Ry.	C. H. Gaunt.	9,430	67	117	9,246	Yes.
Atlantic Coast Line R. R.	W. P. Cline.	4,361	0	0	4,361	No.
Baltimore and Ohio R. R.	Chas. Selden.	4,447	0	0	4,307	Yes.
Bessemer and Lake Erie R. R.	F. W. Smith.	206	0	0	206	Yes.
Boston and Maine R. R.	S. A. D. Forristall.	2,288	0	0	2,288	Yes.
Canadian Northern Ry.	W. E. Muir.	3,355	443	0	2,912	Yes.
Canadian Pacific Ry.	W. J. Camp.	10,396	96	18	10,282	Yes.
Central R. R. of New Jersey	F. G. Sherman.	646	0	0	646	Yes.
Central Vermont Ry.	M. Magiff.	586	0	0	586	No.
Chesapeake and Ohio Ry.	J. S. Stevens.	1,913	122	0	1,438	No.
Chicago and Eastern Illinois R. R.	J. L. Davis.	957	0	0	957	No.
Chicago and North Western Ry.	Wm. Bennett.	7,632	249	159	7,000	Yes.
Chicago, Burlington and Quincy R. R.	W. W. Ryder.	9,023	153	1,773	7,097	Yes.
Chicago, Cincinnati and Louisville R. R.	R. M. Stone.	284	0	0	284	No.
Chicago Great Western Ry.		1,500	0	0	1,500	No.
Chicago, Indiana and Southern R. R.	W. L. Connelly.	309	0	0	309	Yes.
Chicago, Milwaukee and St. Paul Ry.	U. J. Fry.	7,112	144	223	6,000	Yes.
Chicago, Milwaukee and Puget Sound Ry.	U. J. Fry.	720	0	0	720	Yes.
Chicago, Rock Island and Pacific Ry.	J. G. Jennings.	8,000	500	221	7,279	Yes.
Chicago, St. Paul, Minneapolis and Omaha Ry.	Geo. Boyce.	1,729	0	0	1,729	Yes.
Cincinnati, Hamilton and Dayton Ry.	J. L. Orbison.	1,038	0	0	1,038	No.
Cleveland, Cincinnati, Chicago and St. Louis Ry.	C. S. Rhoads.	2,589	35	76	2,478	Yes.
Colorado and Southern Ry.	J. L. Henritzy.	1,952	0	0	1,952	Yes.
Delaware and Hudson R. R.		1,000	0	0	1,000	No.
Delaware, Lackawanna and Western Ry.	L. B. Foley.	957	269	445	243	Yes.
Denver and Rio Grande R. R.	J. M. Walker.	2,782	45	0	2,000	Yes.
Denver, North Western and Pacific Ry.	C. A. Parker.	214	214	0	214	Yes.
Duluth, South Shore and Atlantic Ry.	J. S. Harland.	714	0	0	714	No.
El Paso and Southwestern	H. W. Cutshall.	840	0	0	840	Yes.
Erie R. R.	E. P. Griffith.	2,389	42	104	2,243	Yes.
Grand Trunk Ry. System	W. W. Ashald.	4,644	0	0	4,644	Yes.
Great Northern Ry.	E. J. Little.	6,900	1,259	35	5,606	Yes.
Gulf and Ship Island R. R.	W. L. Oakley.	306	0	0	306	No.
Gulf, Colorado and Santa Fe Ry.	W. M. Knowd.	1,609	200	0	1,409	Yes.
Houston and Texas Central R. R.	H. L. Bennett.	1,020	0	0	1,020	No.
Illinois Central R. R.	G. H. Groce.	5,982	815	594	4,573	Yes.
International and Great Northern R. R.	C. W. L. Mickley.	1,106	0	0	1,106	No.
Iowa Central Ry.		583	0	0	583	Yes.
Kansas City Southern Ry.	R. L. Logan.	900	0	0	900	No.
Lake Shore and Michigan Southern Ry.	Wm. Kline.	1,516	88	91	1,337	Yes.
Lehigh Valley R. R.	F. L. Blendinger.	1,446	59	12	1,375	Yes.
Long Island R. R.	L. S. Wells.	400	0	0	400	No.
Louisville and Nashville R. R.	C. P. Phelps.	4,205	80	30	4,095	Yes.
Maine Central R. R.	E. A. Hall.	925	0	0	925	No.
Mexican Central Ry. Co.	G. O. Perkins.	6,748	0	0	6,748	No.
Michigan Central R. R.	E. H. Millington.	1,730	182	75	1,348	Yes.
Minneapolis and St. Louis Ry.		1,006	0	0	1,006	No.
Minneapolis, St. Paul and Sault Ste Marie Ry.	H. A. Tuttle.	3,392	115	0	3,277	No.
Missouri, Kansas and Texas Ry. System	S. K. Bullard.	3,072	0	0	3,072	Yes.
Missouri Pacific Ry. System	E. A. Chenery.	6,960	0	0	6,960	Yes.

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Mobile and Ohio R. R.	E. E. Torrey	925	0	0	925	No.
Nashville, Chattanooga and St. Louis Ry.		1,236	0	0	1,236	No.
New York Central and Hudson River R. R.	A. B. Taylor	3,389	0	152	3,148	Yes.
New York, Chicago and St. Louis R. R.	G. C. Todd	523	0	0	523	No.
New York, New Haven and Hartford R. R.	N. E. Smith	2,500	0	0	2,500	Yes.
Norfolk and Southern Ry. Co.	M. W. Maguire	581	46	0	535	Yes
Norfolk and Western Ry.	W. C. Walstrum	1,930	0	0	1,930	Yes.
Northern Pacific Ry.	O. C. Greene	5,617	197	176	5,244	Yes.
Oregon Railroad and Navigation Co.	E. A. Klippel	2,046	0	0	2,046	No.
Oregon Short Line R. R.	B. F. Frobes	2,492	48	0	2,444	Yes.
Pennsylvania Lines West of Pittsburg	G. A. Cellar	4,862	0	0	4,862	Yes.
Pennsylvania R. R.	J. B. Fisher	5,313	318	650	4,345	Yes.
Pere Marquette R. R.	W. K. Tasker	2,356	0	0	2,356	No.
Philadelphia and Reading Ry.	C. M. Lewis	3,437	0	0	3,437	No.
Pittsburg and Lake Erie R. R.	F. M. Brown	191	0	0	163	Yes.
Pittsburg, Shawmut and Northern R. R.	C. L. Lathrop	240	60	0	180	Yes.
Queen and Crescent Route	W. S. Melton	630	0	0	630	No.
San Pedro, Los Angeles and Salt Lake R. R.	I. T. Dyer	1,006	0	0	1,006	Yes.
Seaboard Air Line Ry.	W. F. Williams	3,000	0	0	3,000	Yes.
St. Louis and San Francisco R. R.	H. D. Teed	5,054	0	0	5,054	Yes.
Sunset Lines in Texas and Louisiana	Percy Hewett	2,349	0	0	2,254	No.
Southern Railway	W. H. Potter	7,068	0	0	7,068	No.
Southern Indiana Ry.	F. H. Van Etten	346	0	0	346	No.
Southern Pacific R. R.	F. S. Rawlings	4,254	270	0	3,984	Yes.
Terminal Railroad Association of St. Louis	F. E. Bentley	14	0	0	14	Yes.
Texas and Pacific Ry.	Frank Tremble	1,885	0	0	1,885	No.
Union Pacific R. R.	J. B. Sheldon	3,310	123	0	3,187	Yes.
Virginian Ry.	Geo. Reith	442	442	0	442	Yes.
Wabash R. R.	G. C. Kinsman	2,141	0	0	2,141	No.
Wheeling and Lake Erie R. R.	B. B. Baughman	545	0	0	545	Yes.
Totals		213,552	6,681	4,951	200.049	Yes 50 No 30

Mr. C. H. Gaunt, superintendent of telegraph of the Atchison, Topeka and Santa Fe Railway Company, says that while the telephone is more complicated in detail than the telegraph, it is more useful to the railway company for train-despatching purposes than the telegraph chiefly because the train despatcher is better able to keep abreast of his work. From the point of view of safety the telephone is considered equal to the telegraph. His system is making preparations to install 1,400 miles of telephone despatching circuits as soon as possible.

Mr. S. A. D. Forristall, superintendent of telegraph of the Boston and Maine Railroad, reports that his company has material and equipment ordered for one telephone train despatching circuit of fifty-three miles.

Mr. H. W. McConkey, superintendent of telegraph construction and maintenance of the Canadian Northern Railway, says, concerning the use of the telephone on that system:

"We are using telephones on sections of our lines where the remuneration received from many of the stations is not sufficient to justify our employing a telegraph operator. The telephone system facilitates the movements of trains, information to the public regarding trains, cars required, loaded, etc., and any messages of importance. At the points where they are used the telephones are placed in charge of either an employe of the company, or some person living in the vicinity.

"We are looking forward to the adoption of the telephone on other parts of our lines, now that the experimental stage is over. The extension of our lines will be governed by the traffic conditions, on account of the initial cost.

"If instructions given to agents and all concerned are carried out properly, the telephone is just as safe as the telegraph for communication, and for receiving and sending of instructions, the telephone would cover a wider scope, and would more fully meet the demands of business."

Mr. F. G. Sherman, superintendent of telegraph of the Central Railroad of New Jersey, in answer to the question as to which system he regarded as most useful in meeting all around business demands from the standpoint of the railroad, said that he considered the two systems as about equal with the difference if any in favor of the telephone.

Mr. W. W. Ryder, of the Burlington system, Chicago, states that his road is extending the telephone train despatching system as rapidly as possible.

Mr. R. M. Stone, superintendent of telegraph of the Chicago, Cincinnati and Louisville Railroad, says that he prefers the telegraph to the telephone for train despatching at the present time.

Mr. U. J. Fry, superintendent of telegraph of the Chicago, Milwaukee and Saint Paul Railway, and also of the Chicago, Milwaukee and Puget Sound Railway, says that as a general proposition the telephone system of despatching trains is regarded as superior to the telegraph. The latter system, of which he is superintendent, is now equipping seven hundred miles of road with telephone despatching service.

Mr. J. G. Jennings, superintendent of telegraph of the Chicago, Rock Island and Pacific, says that his company regards the telephone system as the simplest in operation and the most useful, taken

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as a whole, and that they contemplate extending this system for train despatching.

Mr. George Boyce, superintendent of telegraph and signals of the Chicago, St. Paul, Minneapolis and Omaha Railroad, says that the system which he represents expects to adopt the telephone for train despatching purposes but that he is unable to state at the present time just when the change will begin.

Mr. C. S. Rhoads, superintendent of telegraph of the Cleveland, Cincinnati, Chicago and St. Louis Railway Company, states that within the next three months his company expects to extend the telephone train despatching system to the Cincinnati Division between Cincinnati and Columbus, O. On this circuit which covers 80 miles of single track and 45 miles of double track they will have 34 offices.

Mr. J. L. Henritzy, superintendent of telegraph of the Colorado and Southern Railway, states that all of the operating officials of his system favor the telephone for train despatching. Adverse business conditions, however, have put a temporary check on proposed changes.

Mr. L. B. Foley, superintendent of telegraph of the Delaware, Lackawanna and Western, which system already has seventy-four per cent. of its total mileage equipped with telephone train despatching circuits, says that his company considers the telephone far superior to the telegraph for despatchers' work, it being quicker and more flexible. He adds that his company intends to install telephone despatching circuits along the entire road.

Mr. C. A. Parker, superintendent of telegraph of the Denver, Northwestern and Pacific, says that they have the telegraph in all stations and use the telephone for side tracks only. As they only have a single telephone wire at present, it will not be practicable for them to abandon the telegraph until they get a good metallic circuit of copper wire, when they expect to use the telephone altogether.

Mr. W. W. Ashald, superintendent of telegraph of the Grand Trunk Railway, says that he considers the telephone far superior to the telegraph and will install it soon in several despatching districts.

Mr. E. J. Little, superintendent of telegraph of the Great Northern Railway, says that his company contemplates installing telephone train despatching service over its entire system as fast as material and the necessary equipment can be obtained.

Mr. G. H. Groce, superintendent of telegraph and signals of the Illinois Central Railroad, makes the following report concerning the progress of the adoption of the telephone for train despatching on the system which he represents:

"The Illinois Central, Yazoo and Mississippi Valley and Indianapolis Southern Railroad Companies combined have a mileage of five thousand nine hundred and eighty-two miles. Up to the month of March, 1908, this whole mileage had been handled by telegraph in so far as train despatching was concerned. We had approximately eight hundred miles of controlled manual block upon which the blocking had been done by telephone for four years and all trains were handled over new tracks during construction by telephone but the regular telegraph system of despatching was put in service on these lines when they were turned over to the Transportation Department by the Construction Department. We have now in actual operation one thousand four hundred and nine miles handled by telephonic train despatching. Of this trackage eight hundred and fifteen miles being single and five hundred and ninety-four being double track.

"In addition to the mileage we now have in telephonic train despatching, we have the line wire strung on eight hundred and fifty miles, and the circuits partly ready. Further extensions of the service are authorized so that we have in immediate sight between twenty-five hundred and fifty and twenty-six hundred miles of telephonic despatching circuits.

"The Illinois Central Company has not employed any exclusive telephone operators for the handling of trains but has used their own telegraph operators. No reduction in the rates of pay of operators has been made and none is contemplated.

"From the experience we have had so far there is no economy found in the use of the telephone as compared with the telegraph from an investment or maintenance standpoint. We do find, however, that the telephone system is more flexible and provides advantages that cannot be obtained by the telegraph.

"Prior to October, 1907, the Illinois Central system was short of operators to the extent of about twenty-five men per day. This was because suitable men could not be employed notwithstanding the fact that within the four previous years the wages of operators had been increased on an average of forty-five per cent. It is felt by the management of the Illinois Central that when the volume of business again reaches the point where all of their equipment is in service they will be able, by the use of the telephone, to employ sufficient non-telegrapher telephone men to meet their service requirements. This is a consummation devoutly to be hoped for and will be a good return upon the investment necessary for the establishment of telephonic train despatching facilities."

The greatest number of offices on any of the telephone despatching circuits of this company is thirty-one and the longest circuit is one hundred and seventy-five miles. They have two hundred and fifty-five offices upon the circuits which are now in operation.

Mr. C. W. L. Mickley, superintendent of telegraph of the International and Great Northern, Palestine, Texas, states that the management of

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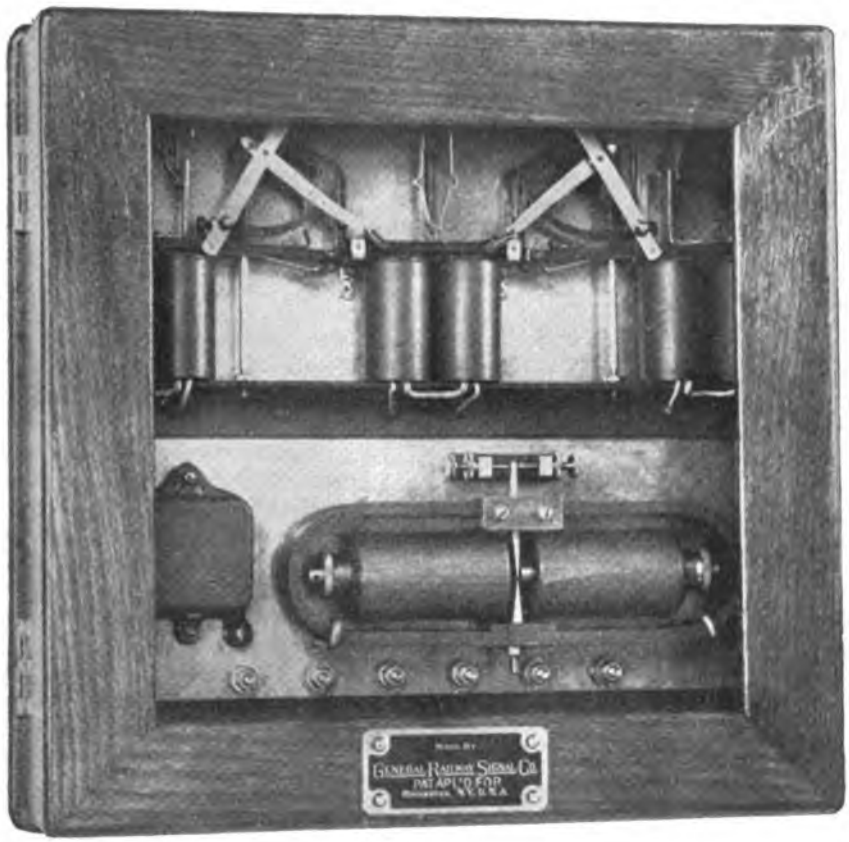

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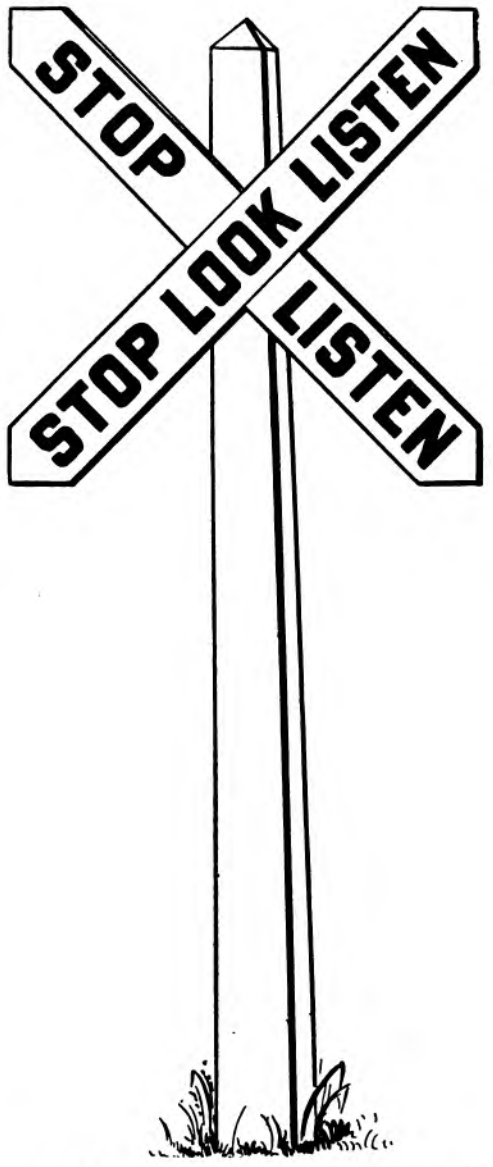

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his company view the telephone despatching system as in an experimental stage, but he believes that in the future it will be the only method used for despatching trains.

Mr. L. S. Wells, electrical superintendent of the Long Island Railroad, says that although his road does not use the telephone for moving trains and does not at the present time contemplate its adoption, he regards the telephone system as much more flexible than the telegraph.

Mr. C. P. Phelps, superintendent of telegraph of the Louisville and Nashville, says that the telephone is decidedly superior to the telegraph for despatching purposes, and that his system contemplates extending its use.

Mr. E. A. Hall, superintendent of telegraph of the Maine Central Railroad Company, says that the use of the telephone for train despatching has not been seriously considered by his system as yet and probably will not be this year.

Mr. G. O. Perkins, superintendent of telegraph of the National Lines of Mexico, states that his system has 2,500 miles of road equipped for telegraphone service but that they do not handle train orders by this method except in cases of emergency. The telephone despatching system is not feasible for his company to use as their despatchers speak English and their operators Spanish. Their train orders are handled in English, which is easily done by telegraph but could not be done by telephone without English-speaking operators.

Mr. H. A. Tuttle, superintendent of telegraph of the Minneapolis, St. Paul and Sault Ste. Marie Railway Company, says that his company uses the telephone on branch lines only, and has not enough telephones in service to form an opinion as to which system is the most beneficial to the road. They do not contemplate extending the system at present. The mileage given for this road includes the lately acquired lines of the Wisconsin Central, now known as the Chicago division of the Soo Line. There is no telephone train-despatching used on the latter, which comprises 1,131 miles of road.

Mr. S. K. Bullard, superintendent of telegraph of the Missouri, Kansas and Texas Railway System, has had no experience with the telephone for train despatching, but expects to give it a trial.

Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific, stated that the matter of telephone train despatching on his system is being considered. He has had no actual experience with but favors the telephone.

Mr. N. E. Smith, superintendent of telegraph of the New York, New Haven and Hartford, says that he cannot say as yet which system is most useful from the railroad standpoint, but that he has prepared an estimate, for approval, covering an installation along 141 miles of single track.

Mr. M. W. Maguire, superintendent of telegraph of the Norfolk and Southern, says he will extend the use of the telephone on his system as soon as possible.

Mr. W. C. Walstrum, superintendent of telegraph of the Norfolk and Western Railway, says that his company is preparing to equip 340 miles of road with telephone train despatching service.

Mr. E. A. Klippel, superintendent of telegraph of the Oregon Railroad and Navigation Company, says that while the management of his company has not as yet authorized any telephonic train despatching circuits, they are keeping informed as to the developments in this system and will undoubtedly get in line with other roads on this proposition within a short time.

Mr. J. B. Fisher, superintendent of telegraph of the Pennsylvania Railroad says concerning the use of the telephone upon the system which he represents.

"We have hardly been despatching trains by telephone long enough to determine whether this is more beneficial to the road for despatching than the telegraph, but the present indications are that it is, and we contemplate extending the telephone system for train despatching as fast as conditions will permit."

Mr. F. M. Brown, superintendent of telegraph of the Pittsburg and Lake Erie, says that while he has used only the telegraph for train despatching purposes he favors the telephone.

Mr. W. S. Melton, superintendent of telegraph of the Queen and Crescent Route, states that he has had no experience with the telephone system up to the present time.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line, Portsmouth, Va., stated that a one hundred and fifty-mile circuit for despatching trains by telephone had been authorized by his company and that the equipment was in process of construction. There will be twenty-eight stations on this circuit, which, it is hoped, will be in operation by August 1. The line is being strongly built, 210-pound copper being used. He adds:

"Our people are convinced that it is the proper thing to do, and while we have not up to this present writing despatched trains by telephone, I will state that we are blocking our trains on a section of 200 miles with the telephone, and will probably extend this, as the telephone gains favor wherever installed."

Mr. F. H. Van Etten, superintendent of telegraph of the Southern Indiana Railway, says that at the present time it is rather hard to determine which system is the best from the railroad standpoint, but that for the present needs of his company the telegraph is most practicable.

Mr. F. S. Rawlings, superintendent of telegraph of the Southern Pacific Railway System, states that his company is now installing a trial telephone despatching circuit of two hundred and seventy miles.

Mr. J. B. Sheldon, superintendent of telegraph of the Union Pacific Railroad, says that his com-

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pany finds the telephone train despatching system very desirable, and a great improvement over the telegraph; that it is more rapid, more accurate, easier to operate and more economical on account of the expedition in the movement of trains which the greater rapidity and ease of use permits. The one hundred and twenty-three miles which they have in operation was only installed as a start. They contemplate the installation of 469 miles more in the near future.

Mr. George Reith, superintendent of telegraph of the Virginian Railway, says that his company is operating a total of 442 miles of railway at present and using both telegraph and telephones for train despatching over the entire mileage. They expect finally to use telephones exclusively for train despatching and local railway business, reserving the telegraph for through and possibly for commercial business. Of course this is merely an expectation and is subject to change.

Mr. B. B. Baughman, superintendent of telegraph of the Wheeling and Lake Erie Railroad, says that the telegraph is probably less expensive but that he is of the opinion that the telephone gives the best results. His company expects to install a telephone circuit of twenty miles on the West Side Belt Railroad.

The Railroad.

Mr. A. M. Ardery, superintendent of telegraph and master of transportation of the Virginia and Truckee Railway, has been appointed the general manager at Carson City, Nev., succeeding H. M. Yerington, resigned.

Mr. Albert Wilcox, who was recently appointed superintendent of the Canadian Northern Railway at Dauphin, Man., entered the telegraph service in 1883 as operator for the Canadian Pacific at Winnipeg.

Mr. Sherwood S. Foley, now superintendent of the Canadian Northern at Saskatoon, Saskatchewan, entered the railway service in 1884 as telegraph operator for the Northern and Northwestern Railway, which is now part of the Grand Trunk system.

Mr. H. A. Shepard has been appointed assistant superintendent of telegraph of the New York, New Haven and Hartford Railroad, with headquarters at New Haven, vice W. H. D. Ford, resigned.

Mr. J. Sutherland has been appointed acting deputy commissioner of railways, telegraphs and telephones for Saskatchewan, with headquarters at Regina.

Mr. G. A. Cellar, of Pittsburg, superintendent of telegraph of the Pennsylvania Lines West of Pittsburg, and newly-elected president of the Old Time Telegraphers' and Historical Association, was a recent New York visitor, coming here on business connected with the interests which he represents.

Charles W. Douglas, aged seventy-five years, a veteran Erie Railroad telegrapher and probably the first train despatcher in the world, having been appointed despatcher on that road in 1851, died at Wayne, N. J., May 31.

Timber Supply for Railroads.

A letter was recently sent to presidents and other officials of railroad companies, signed by Gifford Pinchot, United States Forester at Washington, D. C., calling attention to certain facts concerning the future supply of telegraph poles and railroad ties, etc. Among other things Mr. Pinchot said:

"Since the railroads are among the largest consumers of wood, they will suffer heavily from the much higher prices and the actual scarcity of timber which will occur if our forests are not conserved. Railroad companies can most advantageously undertake both the growing of timber and the economical utilization of the product. They have a steady demand for timber, the extent of which can be largely anticipated, and they need much small timber of kinds which can be grown in a relatively short time.

"Each railroad has its own especial timber problems which must be worked out to meet the given conditions. At the same time there are certain lines of general policy which can be profitably adopted by many roads. They are: First, the use of chemically treated ties wherever possible; second, the use of so-called inferior woods, as, for example, black-gum and loblolly pine, for ties, which will reduce the drain on white oak, and which is entirely practicable if the ties are treated; third, the purchase and management of land bearing mature timber which can be used immediately, and of second growth timber which will meet the needs of the future. Such lands, if properly managed, will insure a perpetual supply of ties and lumber at the cost of production; fourth, the planting of trees upon non-agricultural land owned by the company, which does not now contain sufficient young growth to produce a timber crop; fifth, co-operation with other roads in the adoption of standard specifications for ties and timber and for the treatment of them. Co-operation with timber land owners and the states in fire prevention, and in bringing about conditions which will make the practice of forestry profitable.

"These are in substance the recommendations of the subcommittee on Forest Supply of the American Railway Engineering and Maintenance of Way Association. The adoption of these recommendations and the appointment of technical men to carry them out will, it seems to me, be wise action for any railroad. The influence of their general adoption would be far reaching and most beneficial."

Responses which show much interest are being received by Mr. Pinchot and it is presumed that definite action along the lines mentioned will result.

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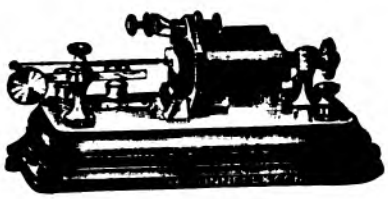

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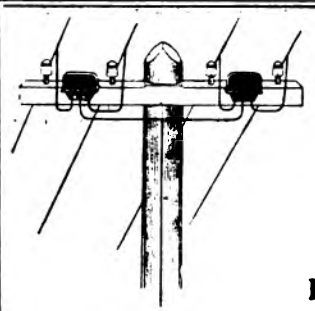

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EXHIBITS AND REPRESENTATIVES AT THE CONVENTION.

(Continued from page 420.)

The interests of the Kerite Insulated Wire and Cable Company at the convention will be represented by Mr. R. D. Brixey, president of the company, and Percy W. Miller. Both Mr. Brixey, and Mr. Miller are associate members of the association and are about as well known to most of the superintendents as their products, which have been standard for over half a century.

The Sandwich Electric Company, of Sandwich, Ill., manufacturers of telephone train-despatching equipment, will be represented at the convention by H. O. Rugh, E. Parsons, E. C. Hennis and C. S. Rhoads.

The Dean Electric Company, Elyria, Ohio, will display a complete line of their telephone apparatus and new equipment for simplex and composite telephone and telegraph work. Messrs. A. D. T. Libby and A. B. Smith will represent their interests at the convention.

The General Railway Signal Company of Rochester, N. Y., will show an interesting exhibit of Groce selectors, the invention of Mr. G. H. Groce, superintendent of telegraph and signals of the Illinois Central Railroad. Their display will be in charge of Mr. M. F. Geer, sales engineer of the company.

The Western Electric Company will be represented by its sales engineer, Mr. W. E. Harkness, of New York, assisted by several other gentlemen from their sales department, including R. F. Spamer and H. L. Burns of New York, and C. L. Honk and J. H. Finley of Chicago.

The Railroad Supply Company of Chicago will be represented at the convention by E. W. Vogel, signal engineer of the company, and a well-known associate member of the association. The exhibit of this company will consist of a full line of their lightning arresters which are designed for the protection of telegraph and telephone lines.

The United States Electric Company will display an interesting exhibit of the Gill Selector. A complete demonstration will be made of the different ways in which this selector can be used both on telephone and telegraph lines. The great success being attained by this selector is due to the fact that it can be connected direct to the line without any intervening relays. The latest type of station equipment has been reduced to a selector and a bell and battery, thus doing away with all possible relay trouble. The ringing of stations is under the complete control of the despatcher who gets an answer back whenever a bell is ringing. The station equipment having been reduced to a simple doorbell proposition reduces the maintenance to a minimum. The selector is operated direct from a central battery at the despatchers' office. The company will be represented by H. E. Merrell, general manager; E. R. Gill, electrical engineer, and M. E. Launbranch, manager of the Chicago office.

A Reminiscence of the Morse Telegraph.

In his autobiography, "Lights and Shadows of a Long Episcopate," the late Rt. Rev. Henry B. Whipple, Bishop of Minnesota, says the Electrical World, quotes an interesting visit made by him to the room in the Capitol at Washington where in 1844 Mr. S. F. B. Morse was experimenting with the telegraph. Speaking of the practicability of making a rapid journey between Albany and Utica in another connection, Bishop Whipple says: "This seemed no less a flight of the imagination that did that of a statement made to me upon my first visit to Washington, in 1844. After visiting the places of interest in the city I went to the Capitol to say good-by to a friend who was a member of Congress. As I was leaving the room he said: 'By the way, the sergeant-at-arms has given a room in the basement to a man who claims that he can send a message by wire in less than a minute. I do not believe in it. It is probably one of the many schemes to get an appropriation from Congress. But it may amuse you to see it.'"

Bishop Whipple continues: "I went to the basement and found a tall, thoughtful-faced man who received me courteously, and in answer to my queries said, with a smile: 'There is no possible deception. I can convince you in one minute of the value of this invention. You see that battery? It is connected with a wire the other end of which is near the Relay House. I will send the message, 'Mr. Whipple, of New York, is here.' In a moment the answer came back. It was before the day of reading by sound, and the alphabet consisted of a series of dashes on a coil of paper. Mr. Morse—for it was he—tore off a slip of paper, and making the alphabet on another slip, said: 'You must read this. What is the first letter?' 'T.' I answered; and on, on, until I was able to read the message: 'Tell Mr. Whipple that he is looking upon an invention which will revolutionize the commerce of the world.'"

Trade Notice.

We are in receipt from the Western Electric Company of a paper weight of a novel design which they are distributing among their customers and friends. The weight, which is in the shape of a metal seal, has embossed upon either side of it a map of the United States upon which are shown the different offices of the company.

The Train Despatchers' Association of America are now holding their twenty-second annual convention at the Great Southern Hotel, Columbus, Ohio. The business sessions began June 15 and will last until June 17. June 18 the convention delegates and visitors will enjoy an outing and dinner at Cedar Point, on Lake Erie. The convention is largely attended by train despatchers from all parts of the United States, Canada and Mexico.

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Telephone Train Despatching.*

BY W. W. RYDER OF CHICAGO.
Superintendent of Telegraph of the Burlington System.

The telephone has been used in a limited way for the despatching of trains for several years, but has been much more extensively used for this purpose in the last fifteen months. During this time the service has been watched very closely and with increasing satisfaction.

In the handling of trains it is of the utmost importance that despatchers be able at all times to get prompt and accurate details of train movements. Up to the present time no method of securing this information has been so satisfactory as by the use of the telephone. Not only does the telephone give quicker and more flexible service, but, if occasion arises, it permits the despatcher to talk direct with the conductor or engineer, and through this personal contact he gets the actual details of the train movement far more satisfactorily than he could have in the old way by telegraph report.

That there may be no misunderstanding of orders given by the despatcher over the telephone, due perchance to haste, it is the custom to have the despatcher copy the order in his order book as he talks it off, thus gauging or reducing his rate of speech to his ability to write it down, and to the ability also of the receiving operators to make their copies, but even this speed is greater than that obtainable by the telegraph.

A further safeguard against error in train orders by the receiving operator is the fact that, as with the telegraph, each operator is compelled to repeat his order word for word to the despatcher, and also to listen to each of the other operators receiving the order while they in turn make their repetitions. The operators in repeating are allowed to read as rapidly as is intelligible, or at a rate far in excess of what they could make on the telegraph key, thereby saving much time for themselves as well as the listening despatcher. All names of stations, where given as meeting points in an order, and all figures are spelled out letter by letter both in the transmission of the original order and in all repetitions.

Then again the promptness with which operators respond to calls is a very important improvement. With the telegraph the call for any one operator is heard by all the others on the line and frequently considerable time elapses before it attracts the attention of the one called, and during such use of the telegraph circuit no other business can be transacted over it. With the telephone by the use of a selector the call for a particular operator is heard only in his individual office, where it is made on a large vibrating bell, instantly attracting his attention and securing an immediate response. While this call is being made the circuit can be used at the same time for conversation, and during even the short time elapsing between the call and response oftentimes several offices will cut in and report trains or give the despatcher other information.

These various savings in time—never at the expense of accuracy—greatly aid the despatchers in keeping their train sheets up to date, and this condition is secured with much less physical effort.

Equally serviceable is the telephone in handling way office communications other than train orders, including Western Union messages, and here the question of quickened service is still more noticeable. Actual experience demonstrates the fact that it is possible to handle a much greater volume of business to and from the way offices by telephone. In one case where more attention has been paid to this feature than elsewhere the increase regularly amounts to more than 75 per cent.

Another exceedingly important feature in the use of the telephone is the fact that it works even better in bad weather than in good, just the reverse of the telegraph, and if there is ever a time when good service is needed it is when the weather is wet and foggy. I say the telephone works better in wet weather because it is a fact that the lower the static capacity of a telephone line the more satisfactory the service and damp weather tends to reduce this static capacity.

Then, too, adverse weather conditions such as frequently make the telegraph absolutely unusable have no effect on the adjustment of the telephone. It stands ready for immediate use in all kinds of weather. With the telegraph there is frequent exasperating interference with the despatcher's or relay operator's efforts by reason of an instrument in some way office being out of adjustment and the inattentive operator making no effort to see whether or not this is the case but the telephone is not subject to this annoyance.

Another feature to be considered in substituting the telephone for the telegraph is the increased ability in securing operators. It is far easier to train telephone operators than to secure competent telegraphers. There is hardly a town anywhere on the line in which there are not bright young men who with the proper training would be perfectly competent to act as telephone operators, and this without the considerable study necessary to pick up the art of telegraphy itself. And it is far better policy to make use of men in their home towns or who have grown up along the line, as they usually have a local pride or interest in the success of their work. Our telegraph service was at its best when this condition existed to a considerable extent, and personal interest and discipline have lessened in proportion, as we have been compelled to import telegraph talent. Now the use of the telephone is enabling us to return to the basis here outlined with resulting improvement.

Another gain in individual interest is made by the telephone permitting a closer personal ac-

*Paper read recently before the St. Louis Railway Club.

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quaintance between despatchers, operators and other employes through frequent direct conversations, which greatly increases co-operation—a most necessary but too frequently a missing factor in all work.

The initial cost of a telephone circuit is somewhat greater than that of a telegraph circuit, and the maintenance expense will probably be somewhat greater, but the benefits derived from the change more than offset the increased expense.

I firmly believe the telephone will continue to prove greatly superior to the telegraph in handling such business as we have been discussing. Certainly with the repetition of train orders handled in exactly the same manner as was done by telegraph, and with the repetitions of Western Union and other telegrams (not a former telegraph practice) there is no question but that the telephone service is as safe and accurate in every way as is the telegraph. In fact, during the past fifteen months, or since the rapidly increasing use of the telephone in despatching began, there has been no accident of any nature that can in the slightest degree be attributed to the changed method. This surely emphasizes its reliability.

Transmission of Thought by Wire.

"Thought will be transmitted just as a telegram is. Thought energy can be carried along a conductor and into the earth much in the same way as a lightning rod conducts lightning. It is more than possible that thought can be conducted and make itself visible in writing."

These remarkable conclusions concerning thought transmission are reached by Professor Kotik, of Moscow, a psychologist with a European reputation. He publishes them in a pamphlet, entitled "The Invisible Thought Photography." It is attracting as great attention in Germany as it is in Russia.

Kotik made the experiments on which his conclusions are based on a girl fourteen years old, daughter of a professional thought reader, and her father. He chose them because their minds are trained. Kotik's audience was composed of the members of the inner clinic of Moscow University, who may be regarded as experts in psychology. The girl's eyes were carefully bandaged, her ears were stuffed with paraffin and cotton; literally, she was blind and deaf for the time.

In the first experiment her father stood on a bare wood floor, he holding her hand. She "read" quickly and accurately all the words and short sentences her father presented to her while he held her hand. The words and sentences were written by persons in the audience, and most were in languages which neither father nor daughter understood. A physician wrote in Greek. The girl, her eyes bound still, reproduced the Greek characters in chalk on a blackboard.

Father and daughter were then placed on either side of a closed door so that they could not clasp hands. The test words written were all Russian. It is difficult to reproduce the result of this experiment satisfactorily to English-speaking readers. The Russian word "stol" (table) was given to the father. The girl read "stuk," which means "piece." The word "parschod" (steamer) was written; the girl made it "purked," which means nothing. Several other complete words were given, but with only one exception they were all maimed and mutilated by the girl, but not so much as to be devoid of all resemblance to the test word presented by the father.

More extraordinary results were then achieved. The wrists of father and daughter were connected by a fine copper wire bound around them. The girl was still blind and deaf, but even when they were separated by the length of the great hall of the clinic she read with the greatest ease the written words given to her father.

Next they were separated by a locked door. She was successful at every attempt.

Two rooms and three locked doors were placed between them, the wire being slipped under the door or through the keyhole. The result was equally successful.

The wire was then fastened in various places to the wall to prevent vibration or pulling or other mechanical telegraphy. About the results there Professor Kotik is somewhat contradictory in his statements. He admits there was considerable hesitancy in the girl's responses, but insists that what was achieved proves beyond a shadow of doubt that it is possible to transmit thought telegraphically.

As a climax to his experiments, Professor Kotik placed father and daughter in the same room, their wrists bound by the same delicate copper wire. Really as far as thought transmission is concerned they were far separated, for yards of wire were coiled between them. But without hesitancy the girl read the words placed in her father's mind.

This girl later was subjected to another test, and stood it most successfully. At a seance a doctor wrote a letter and placed it, folded, in an envelope. The girl's father was not in the room and knew nothing of the contents, neither did Professor Kotik. The letter was handed to the girl, who, after some moments reflection and without opening it, read aloud its contents. Considering that the girl was surrounded by cold blooded, skeptical scientists, this story is so remarkable that before believing it ordinary students of psychology will await further details. Indeed, it is strange that a man of Kotik's great reputation should unhesitatingly pin his faith to the idea of thought transmission by these means.

In Germany men like Professor Benedikt and Professors Moll and Dessor hesitate to give their sanction to the new doctrine until more careful experiments, eliminating all possibility of mistake, have been tried.

Orders, if sent to Telegraph Age, Book Department, for any book required on telegraphy, wireless telegraphy, telephony, electrical subjects, or for any cable code books, will be filled on the day of receipt.

A New System of Wireless Telegraphy Used by the Telefunken Company.

BY COUNT ARCO.

After it had been discovered that by means of the Poulsen arc it was possible to generate undamped oscillations of considerable energy, several scientists, especially those of a theoretical turn of mind, were inclined to lay too much stress on the advantages of this system, and the opinion was expressed in several quarters that undamped oscillations obtained from arc lamps would replace the other methods of generation within quite a short time. Practical men spoke against this enthusiasm, and drew attention to the numerous disadvantages present in the new system. To-day, scarcely three years after this period, it cannot be denied that the warning of the practical men was justifiable, and that the disadvantages of the arc lamp are even greater than the greatest skeptics thought. Not only from the practical point of view has the system been found disadvantageous, on account of the heavy upkeep and the many complications, but from a purely electrical point of view as well the position is the same. Of the energy generated at the sending end only a small fraction (at most one-tenth) is converted into electrical oscillations. For this reason both apparatus and machinery must be large and heavy. Moreover, the theoretical advantage (great freedom from disturbance from other stations and from atmospheric effects) is not obtained in practice.

Within the last year the Telefunken Company have designed a new system which is a compromise between the spark system of Marconi and that known as the undamped oscillation system. This new system is known as the "singing spark" system.

As regards the technical peculiarities of the new system, it may be said that it depends on spark methods, which in themselves depend on the principle published in December, 1906, by Professor Max Wien and called by him "Stosserregung." This name has been changed by the Gesellschaft für Drahtlose Telegraphie to "quenched spark." This principle has been so perfected by the company that the sparks follow each other equally and regularly; so regularly, in fact, that they give out a clear musical tone, and to this system the name of "singing spark" has therefore been applied.

The first two types of station constructed by the company are: (i.) A ship or land station having a capacity of from one-half kilowatt to two kilowatts, and suitable for both large and small ships as well as for portable military stations It has a radius of action of 62½ to 500 miles both to land stations and ships. (ii.) The largest ship station at present erected, having a capacity of from eight kilowatts to ten kilowatts. With this type it will be possible with standard ship antennae under favorable conditions, to transmit 1,875 miles, a distance which has never before been reached from ship to ship. The same station is also suitable for work on land with correspondingly larger antennae.

The practical and technical advantages of the new system over the older spark methods, as well as over the undamped arc oscillations, are summarized in the following paragraphs:

Singing sparks allow the work to be carried on with considerably smaller antennae than do the usual wireless systems. The reason for this lies in the speed with which the sparks follow each other in the secondary circuit, thus making it possible to transmit greater power from the antenna at a smaller maximum voltage than formerly. For this reason the new system is specially suitable when it is necessary to transmit over long distances with small antennae. Theoretically this should also be the case when arc lamps are used, as for a given amount of energy the voltage lost in the antennae is a minimum. Practice, however, has shown that with arc lamp installations the maximum height of mast must be employed, say, from 300 feet to 330 feet, while with the new system the same distance can be covered with masts about half this height. The reason for this contradiction between theory and practice is explained by the fact that the nominal oscillation energy from the arc lamp can only be generated when the wave length is very great, which means high antennae. On the other hand, singing sparks work as well with the smallest as with the greatest wave lengths.

Singing sparks allow a high machine efficiency to be obtained, for, according to the size and suitability of the apparatus, from fifty to seventy-five per cent. of the machine output can be changed into energy at the antennae. With the old spark systems the maximum figure was twenty per cent., and in the arc lamp arrangement ten per cent. In places where current for working the station has to be specially generated, this superiority obtained by using singing sparks will lead to a considerable decrease in the working costs. Further, it is specially advantageous where questions of weight and volume have to be considered, since in small ships and portable stations with this system the power and weight for an equal range is only about a quarter of that needed for arc lamp stations. On account of this great efficiency another advantage arises. The wear and breakdowns of the apparatus are small, because of the small heat losses present, while regulation of the spark length, or of any other important part, of the new sender is hardly ever necessary. On this point Dr. Kiebitz has remarked that "in the singing spark system we may have a final solution to the problem of high frequency generation."

With the new system it is possible to build senders as large as may be desired without any such limitations (e. g., in the wave length) or difficulties (e. g., in the constancy of the oscillations) as occur when a large amount of energy

is transmitted. The new system behaves quite like the spark method, in which power as great as 100 kilowatts can be transformed into oscillations (though at a very low efficiency). It works better than the arc method of generation, for in this system if a large amount of energy is used, there not only is excessive damping on the long wave lengths, but irregularities of many kinds creep in, because at very high voltages and currents an arc lamp is unsteady, and the great development of heat gives rise to a rapid burning away of the electrodes. As, moreover, these inconstant conditions in the arc have an influence on the frequency the system is put at a still further disadvantage. Such alterations are much more likely to occur at large stations, and it has been up to date impossible to install this method of working for plants of large size.

The sender in the singing spark system is almost as noiseless in its working as is the arc lamp.

The sender transmits only one wave, and is thus different from the spark sender, which transmits two coupled waves. This fact marks a great step forward, as the receiver is able to utilize the total sender energy, and, owing to the disappearance of the two coupled waves, multiple telegraphy is made much more easy. Under such conditions numerous stations can work undisturbed close to each other.

The wave sent out by the singing spark shows a very small damping, viz., between 0.08 and 0.025, thus enabling a very sharp tuning and great freedom from disturbance in the receiver to be obtained. The freedom from disturbance may, according to circumstances, be much greater than that obtained with undamped oscillations. It varies, under conditions to be hereafter described, from two to five per cent.

These singing oscillations remain absolutely constant and are independent of the arrangement and mechanical properties of the spark gap and very much greater freedom from disturbance can be obtained than with the arc lamp. In the latter the greatest freedom is theoretically from one-half to one per cent., because the frequency does not depend upon the electric constants of the circuit alone, but on the arrangement, length and properties of the arc. So long as the principle of generating undamped oscillations has to depend for its frequency on so variable a value as an arc lamp, ideal freedom from disturbance will never be obtained. In spite of the control of the resonance by means of a wave measurer, the frequency of the arc lamp alters, and a choice has to be made at the receiving end between a highly untuned receiver, whose intensity constantly varies so that certain telegraphic working is difficult, and a receiver very slightly free from disturbances, in which the total employment of the resonance is renounced so that the range is reduced. Arc lamp practice requires that the latter method should be chosen. The real freedom from disturbances of undamped waves reaches only five to six per cent., and even this, from the fact which we mention later, is seldom obtained in practice.

The freedom from disturbances of two to five per cent. obtained with singing waves may be understood by considering the following example: At the three angles of an equilateral triangle, ABC, three stations of equal power are placed, A and B being fitted with senders and C with a receiver. C can then, as desired, receive from A or from B when these have a difference of wave length of only five per cent. This condition depends on the fact that the distance apart of the three stations is as great as possible for the energy available, so that the telegrams will not arrive at C with very great intensity. If the distance apart of the three stations is reduced to one-half that mentioned previously the senders at A and B can be made different by three per cent. instead of five per cent., or by still smaller differences if the distances are still further altered. When speaking of freedom from disturbances, it is understood that the percentual differences which must necessarily be present at the maximum range are included.

Singing sparks allow a large scale of oscillations to be obtained, while with the old spark stations only certain fixed waves could be sent out; and, on account of electrical resonance, the scale of waves could only differ from the fundamental of the antennae by about double the wave length. It is possible with this new system to obtain oscillations of wave lengths four, five and even six times as long as the fundamental, though the range gradually decreases. This new system behaves exactly like the arc lamp system, except that the singing oscillations have the advantage that antennae with very small fundamentals can be used, while with arc lamps these large scales of oscillations can only be employed with very high masts and long antennae. The generation of the different oscillations can be obtained on the new system in a very simple way by using the regulating arrangement known as a variometer, and without the use of a wave measurer being generally necessary.

As mentioned in the previous paragraph, the system allows very short oscillations to be transmitted. Short oscillations are, however, more absorbed on the way, though this apparent disadvantage is often a very great advantage from the military point of view. Suppose a message is sent with very short oscillations to a station fifty kilometres away, and is received with great intensity. The enemy at a distance of, say, 100 kilometres, would scarcely be able to pick up anything, even with the most delicate instruments, while the behavior of longer waves is quite different. Over open country, distances of over 200 kilometres to 300 kilometres can be covered by these waves, and they possess the advantage that a listener a little farther off cannot understand anything. It is, further, possible by using quite short waves to

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remove the instrument from the operations of large stations which only work with long waves. The use of short waves, also, predicates an extraordinarily high antennae efficiency, as, on account of the more speedy transmission of energy with short waves, the maximum energy for a given antennae can be increased.

The system of singing sparks allows under all circumstances, unlike the arc lamp, full freedom from disturbance, as the intensity of the oscillations can be regulated in a most simple fashion between wide limits. Even with a station having a range of several thousand kilometres, the intensity can be so reduced that telegrams will only be heard over a distance of 100 kilometres, and, further, "tapping" by unauthorized persons is made very difficult and the freedom from disturbances is greatly increased. Take, as an example, that given previously. Suppose the range of a sender, say, at B to be reduced to one-hundredth of the distance from B to C, a five per cent. freedom from disturbance will become, perhaps, thirty per cent. if B does not reduce its sending intensity. To do this is quite possible with the new system, while regulating an arc lamp on a small current leads to an unsteadiness of the flame and makes the apparatus work badly. It is, therefore, not very correct to speak of a freedom from disturbance of five per cent. with the arc lamp when in many cases a freedom from disturbance of only twenty to thirty per cent. is really obtained.

Perhaps the greatest advantage of the new singing spark is the fact that the signals are transmitted as clear musical tones. Musical sparks have already been often proposed and also partly developed, but the tone cannot be made clear, and only by the absolute clearness and regularity of sound were the above results obtained with the new system. With audible working from the old spark stations the signals in the telephone were received as ticks. Each time the spark passed the membrane moved, while with the arc lamp similar noises were also obtained. Similar phenomena are noticed with atmospheric discharges in receivers at these stations, and with this arrangement the working was often disturbed in spark stations; but the conditions were much worse in arc stations, as the noises from atmospheric disturbances are very much like those given by the latter type of working. It is, however, quite different when receiving the sound from the musical spark system. However numerous and strong the discharges may be, an even slightly skilled telegrapher can distinguish them by their singing tone. The sound, if it is truly musical, can be clearly heard even if it is very weak. It may be said that for the first time since the invention of wireless telegraphy a system has been obtained which enables telegraphic work to be carried on through the heaviest atmospheric disturbances, and up to the limit when the detector would break down under the atmospheric discharges.

The use of a particular tone gives the sender a certain individuality. Turning again to the three stations at the corners of a triangle, it may be supposed that station A gives a sound with a frequency of 500 per second, and B one with a frequency of 1,000, so that C can receive telegrams at the same time to both stations quite separately with only one antenna, a receiving apparatus, a detector, and only when the two senders are transmitting oscillations of nearly the same wave length need two operators be present, one of whom writes down the telegram with the higher sound and the other the one with the lower. By this means great simplicity in working and quite considerable freedom from disturbances are obtained. It is no longer necessary to tune the receivers for multiple telegraphy, for it often occurs with this arrangement that the sender for which the receiver is not tuned begins to work. To prevent this danger a suitable working rule has not yet been found. Electrical tuning by using a long wave scale can also be obtained, and by this method not only two but a great number of stations can work without disturbance from each other.

The system of singing sparks allows an acoustic tuning of the receiver to be obtained by the use of clear musical tones, while these, as shown previously, depend on the selective capacity of the human hearing, so that certain parts—for instance, parts of a so-called sound intensifier—can be imposed on the frequency of the sounds received, and prevent senders of other sounds, impulses from ordinary spark stations and especially atmospheric disturbances from interfering.

As to a receiver for this new system, all the well-known acoustic receivers can be used, and no "Ticker" is necessary at the receiving end. In spite of this, a new receiver has been designed for all sizes of stations, which both in construction and in electrical arrangement does not differ considerably from the present type of receiver. A special receiver has also been designed which, as a result of a number of measurements, has been shown to be capable of receiving over a large scale of wave lengths, from 200 to 3,000 metres, with a very small loss from damping in the tuning arrangements. The operation of the rectifying detector, working on the principle of the contact detector, is very sensitive, being about twenty per cent. more sensitive than the electrolytic type. It is also very constant, and is not disturbed either by atmospheric discharges or by "over-intensity" due to neighboring or strong senders. In connection with this receiver two boosting apparatus have been designed which employ the special advantages of the new form of musical sender. Both these apparatus are of great practical importance. There is then the calling apparatus, which is employed instead of the telephone receiver on the standard receiver, and rings an electric bell whenever a singing sender works for over ten seconds; but for atmospheric discharges and for discharges from the usual spark sender, as well as for Morse signals, it does not ring, though the calling arrangement operates up to the limit of hearing ca-

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pacity. The second apparatus is a resonance relay, which makes it possible to intensify the weakest signals while still keeping them as clear musical tones, so that they can be received in the station. Such an increase is only possible by the use of a body oscillating with mechanical resonance, and the sound must be quite clear. By the use of a relay, atmospheric disturbances are practically cut out, as single discharges only slightly influence the resonance system. Several relays of different tones make it possible to differentiate between signals from different senders which are transmitting with equal wave lengths but different notes, and differentiations to be made without the help of the human ear, which becomes tired.

The Stenocode.

Mr. A. C. Baronio, of London, England, the code and telegraph specialist, has issued an instructive circular setting forth the advantages to be derived from the use of his Stenocode system, of which he is the inventor, and of which he has made a study for many years. In his circular, Mr. Baronio says in part:

"The Stenocode is the latest development of a scientific general scheme designed to facilitate and expedite the work of accurate telegraphic communication. By its use not only is the traffic capacity of the telegraph services greatly increased, but also a simple, comprehensive and elastic system of economical and complete coding is furnished. It also obviates all the complications and conflicts of interest which have arisen between the telegraphing public and the telegraph administrations since the admission of artificially-formed ten-letter codewords under the sole limiting qualification of pronounceability.

"The word 'code,' as used by the telegraphic world, has two significations. It is used indiscriminately to indicate the range of symbols that go to make up a telegraph alphabet, such as the 'Morse code,' or to indicate some specially preconcerted arrangement whereby ordinary language is condensed into fewer words and rendered intelligible only to those who are in possession of the key.

"In its most extended sense the 'Stenocode system' embraces both these significations and, further, includes the designs for the apparatus required in some methods of applying the system.

"It provides a syllabic alphabet requiring less effort and materially less time for its transmission over lines and cables than that required by the present telegraph alphabet, and also a system of building up codewords that can be transmitted either by its own special combinations of symbols or by the present 'Morse Code.' This system of wordbuilding is capable of effecting, by preconcerted arrangement, all the condensation and secrecy of any existing public or private codeworks, and also enables any expression not so provided for beforehand to be condensed into much fewer words than would be required by plain language, with complete secrecy and with each word, preconcerted or otherwise, expressed in a form most conducive to accurate passage over the lines.

"It is with the second of these provisions that the author is at present more particularly concerned, and he wishes it to be clearly understood that the Stenocode system makes no pretence at competing in the work of word code making pure and simple. The number of such word codes is already legion, and though their forms may be vastly different yet they all possess the common characteristic that for the most part they consist of mere conglomerations of letters huddled together without any idea of distinctness, freedom from confusion, or ease and quickness of handling from a telegraphic point of view.

"He would also point out that it is hardly consistent on the part of the telegraphing public to look for cheaper rates and continued accuracy from the telegraph services while itself taking advantage of every technical concession to couch its messages in forms which impose extra labor and strain on the operators, conditions, the natural concomitants of which are slower speed and decreased accuracy.

"The Stenocode, on the contrary, builds up the message by an arrangement by which the signals, either of its own code or those of the ordinary telegraph code, are caused to assemble in certain constantly recurring biliteral syllabic combinations specially adapted to remedy these defects, and these syllabic combinations are formed into codewords for tariff purposes by the simple process of dividing them off into groups of five syllables each."

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.

Radio-Telegraphy.

The Marconi Wireless Telegraph Company is erecting wireless telegraph stations at Three Rivers and Montreal, Que.

At the regular monthly meeting of the Wireless Institute of New York, held June 2 in the Engineering Societies Building, Mr. Jack R. Binns presented a paper entitled "The Wireless Telegraph in Marine Service," and Mr. Harry Shoemaker discussed the subject of "The Production of High-Frequency Oscillations."

The Collins Wireless Telephone Company has an interesting exhibit in the manufacturers' building at the Alaska-Yukon Exposition at Seattle. They also have wireless telephone stations installed at various points around the Exposition grounds, from which connection can be obtained with the central station in the manufacturers' building.

The Hydrographic office of the United States Government has recently prepared a map on which are shown the wireless telegraph stations of the world, which are under governmental control as well as many commercial stations. There are 468 stations shown on the chart which includes all of those concerning which information had been obtained up to February 1.

The Lepel System of Wireless Telegraphy.

An English contemporary has this to say in part upon the Lepel system of wireless telegraphy:

"One of the deficiencies of most of the present systems of radio-telegraphy is that the spark gap which is shunted with a condenser circuit has to be made comparatively large for the energy of oscillations produced, in order that the disruptive discharge across the gap shall not be followed by arcing. The Lepel system of wireless telegraphy permits the use of a large supply of energy with a very small gap. In one arrangement of the Lepel transmitter, a continuing source of electric energy is supplied through resistances to two electrodes which are separated by thin disks of paper with a hole punched through the center. The electrodes are also connected to two oscillatory circuits of different capacities, but having the same natural frequency. The radiating circuit is coupled inductively to one of these circuits. It is found that a rapid succession of sparks takes place across the gap, gradually burning away the paper, oscillatory currents at the same time surging in the condenser circuits. The action would appear to be as follows: The condensers are charged till the sparking potential is reached; a spark passes, and a small portion of the oscillatory energy probably follows the spark, but as the oscillation constants of the two circuits are the same, and very slightly damped, the discharge tends to take place in the complete circuit with both condensers and both inductances in series. As this discharge hardly flows through the gap, the source of supply continues to charge the condensers instead of arcing across the electrodes. If sparking only took place at one point, the local heating would make the air between the electrodes conducting, and an arc would be formed. The action of the paper is apparently to keep the sparking points continually on the move."

Radio-Telegraphic Installations for Short Distances.

According to the London Electrical Review, some experiments in transmission over short distances with small power were carried out recently under the direction of Major O'Meara, Engineer-in-Chief to the British Post Office, between the two Post Office radio stations, situated at Hunstanton, in Norfolk and Skegness, in Lincolnshire.

Temporary aerials, eighty feet in height were erected at each station, and the usual earth connection was utilized. The aerial consisted of two 3/18 stranded copper wires spaced about four feet apart, up to their full height of eighty feet, at which point they were extended outwards in a sloping direction away from the communicating station. The length of each sloping portion was seventy feet. A motor-car ignition coil of the small high-speed trembler type was used for charging the Leyden jars, with an average current through the primary coil of about two amperes, taken from three small secondary cells. The current in the aerial ranged from one and one-half to two amperes, as shown on a Duddell thermo-ammeter.

The secondary of the coil was joined to the inner cotings of two Leyden jars, each .003 microfarad capacity, whose outer coatings were connected through an inductance of four turns of 7/22 copper wire wound on a box approximately twelve inches square. The spark-gap of about one thirty-second of an inch was joined across the jars.

The inductance in the jar circuit was exactly similar to another in the aerial, and formed with it the two portions of an adjustable transformer.

In another arrangement the aerial and earth connections were joined direct to the jar inductance, and the aerial inductance was omitted. An ordinary Morse telegraph key carried the primary current without any appreciable sparking.

The signals at the receiving station sixteen miles away were most satisfactory, both on a De Forest electrolytic receiver and on a Marconi magnetic detector. The wave length was 800 feet.

The results obtained from these experiments are very encouraging, but it must be borne in mind that every small station equipped will need the services of at least two skilled telegraph operators. This requirement is very costly, and will probably, in many cases, ultimately outweigh the cost of a submarine cable fitted with telephones, which anyone can operate.

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
Burry Page Printing Telegraph .....Apl. 1, 1903
C. K. Jones' Automatic Telegraph Circuit Protector and Signaling Machine .....June 16, 1903
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. 11, 1903
Scott-Phelps-Barclay-Page Self-Winding Ticker.....Oct. 1, 1905
Specifications in Construction of 25-foot Pole Line, American Telephone and Telegraph Company...Feb. 16, Mch. 1-16, 1904
Typo-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 Hotel Pontchartrain, Detroit, Mich., June 23, 24, 25, 1909.

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 Association meets in 1909 at Columbus, O., June 15, 16, 17, Great Southern Hotel.

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.

The Military Telegrapher in the Civil War.

PART XXI.

Charles H. Lehr, being employed on telegraph lines in Missouri was, in the pursuit of his duties, drawn into the hostilities soon after the outbreak of the Civil War, having to defend the lines over which he had charge from the depredations of the Rebel bushwhackers. Later entering the service of the United States Military Telegraph Corps, he served in that body with distinction, and had many narrow escapes from capture by the enemy. In writing to Colonel William R. Plum, the historian of the corps in 1878, he gave the following graphic account of his experiences while in the government employ:

"The commencement of the war found me in the Springfield, Mo., office, on the C. M. Stebbins lines which extended to Fort Smith, Ark. Before acual hostilities began Union men and secessionists commenced bushwhacking each other in that section, and my first experience with these Rebel bushwhackers was while repairing breaks in the wires down near the Arkansas line. I was fired at twice in one day but continued the work until I had made a connection. When I arrived home, however, the wires were all down again both north and south. I then employed another man to help me, and we started north. We found half a mile of wire missing five miles from town, and while repairing this break we were fired upon again by concealed enemies. As we were well armed with breech loaders, we started for the brush and sent in a few stray shots to the point where we saw the smoke rise. After all had become quiet, we again resumed our repairing without any further molestation, but it was an unpleasant and ticklish job as we expected to hear a ball whistle by our heads every moment. We finished the break and returned, but found the lines cut again when we reached the office. I then wrote to Mr. Stebbins at St. Louis the condition of things, and received orders to let the lines go, but remain at Springfield until I received further orders. Not having anything to do I joined a home guard company for the protection of property and the lives of Union men. We had some very lively times with horse thieves and bushwhackers, and made many important arrests. In the latter part of June, Colonel Sigel arrived at Springfield with two regiments of Missouri troops. These were the first soldiers I saw. Our company joined them and marched out to head off Generals Price and Jackson, who were being chased south by General Lyon. We soon found them and the battle of Carthage, Mo., was fought. The next day I received orders to report at St. Louis, where I arrived on July 5, 1861. As nearly all of Stebbins' lines had been destroyed, he could give me no work at that time, so I went to Cairo where my nephew, Adam Bruch, was stationed. I there met Colonel J. J. S. Wilson, who had already been appointed assistant manager of military lines. He sent me to northeastern Missouri, opposite Quincy, Ill., as operator on military and overland lines, to receive and forward all business for points west as well as the pony express business from and to the Julesburg overland line, until they could lay a cable across the Mississippi. While at this point our lines were destroyed between West Quincy and Palmyra, Mo., at the junction of the St. Joe and Hannibal road. I went to Palmyra on a train to keep up communication. The junction is one mile from town, and while working one night at about eight p. m., a company of Rebel horsemen suddenly surrounded the depot, and in a few moments half a dozen dirty looking villains rushed in on me presenting a six-shooter at my head with a threat of its contents if I made a move. After searching the office for valuables and important telegrams, they departed, leaving me unmolested. I was taken sick here with swamp fever, but after a few days managed to go home to Canton and remained there two months. In the meantime, Samuel Bruch had been appointed superintendent of the Southwestern Telegraph Company's lines at Louisville, and also assistant manager of the United States military lines. Mr. Bruch wanted me to report at Louisville at once, and arriving there November 2, 1861, I was sent to Lebanon Junction office as military operator with the second and third Minnesota Regiments. I remained there until January, 1862, when I returned to Louisville as cipher operator, and also to work lines south of Louisville. I remained there until July, when I was ordered to Barboursville, Ky., to relieve Captain W. G. Fuller, who was sick at this point, and to take charge of the construction corps under Foreman W. L. Tidd, who was building a military line to Cumberland Gap. I remained there until the line to the Gap was finished, when I again returned to Louisville office as cipher operator, remaining until the winter of 1862-63, when I was appointed chief operator of military lines in Central and Eastern Kentucky, including Eastern Tennessee with headquarters at Lexington, Ky.

In the early part of the spring of 1863, I began the construction of a military line from Nicholasville to Danville, Ky., by way of the famous Camp Dick Robinson. I attempted to construct this line with details of soldiers, and it was certainly the saddest line building experience I ever had. The soldiers would not obey orders, swearing that they had not come out to build telegraph lines, but to fight; they would often desert entirely, scattering around at the farm houses. I finally had a guard detailed to keep them at work. While acting in Kentucky as chief operator, I constructed many branch lines connecting all important points in the blue grass region. In August, 1863, I started with Tidd's construction gang, to follow General Burnsides into East Tennessee. I first met the general in camp at Crab Orchard, and found him the most genial and pleasant man to get along with that I had met in all my telegraph service. He had unbounded

faith in the telegraph and gave me all the material aid in his power to help it along. I remember that on this campaign his entire army was short of supplies on account of the difficulties of following with supply trains over almost impassable mountain roads. At Mount Vernon, Eastern Kentucky, I needed two more horses for our telegraph train with forage and commissary supplies for the horses and men, and had made out requisitions on his proper officers, but could obtain nothing. Seeing the general in his tent, I went directly to him and told him my wants and the difficulties with his staff officers. In reply he said: 'Don't ever bother with those fellows again, but when you want anything, come directly to me, and I will see that you get it. The telegraph has to go along with me at all hazards, if it takes half of my army to do it.' He then sat down and wrote strict orders to all quartermasters and commissaries in his department to let me have anything I might call for on my own written order, and I had no more trouble after this in getting supplies. One day in the mountains of Eastern Tennessee the general stopped a provision train, and made them unload the entire contents of one wagon of provisions for our benefit, and had it turned over to me without my even giving a receipt for it, saying, 'I will make it all right with the quartermaster.'

"We followed the army to Cumberland Gap, rebuilding the line of the summer before most of which had been destroyed by Bragg's army and Rebel raiders. In fact the Rebels had taken about all of the wire and most of the insulators to construct some of their own military lines. On this route we followed the army so closely that we had an office open at headquarters every night until we came to the Gap. I left Tidd to follow up De Coursey's brigade from Barboursville, and in company with Burnsides two headquarters operators followed into East Tennessee by way of Williams' Gap, striking the East Tennessee line at London Bridge. We came in on the Rebels so unexpectedly that we captured the operator in his office, and secured many messages before they were aware of our presence.

"I left Operator Charles W. Jaques here and following the cavalry force up the line captured the operator at the next station, going on immediately to Knoxville. Reaching the latter place late in the afternoon, unannounced and unexpected, we went to the telegraph office, but the two operators escaped by a back door as we came in at the front. We captured here a number of important messages with a large main battery and everything in complete working order. We opened communication with London Bridge, and having C. H. Johns, the other headquarters operator, here, I followed our cavalry up the East Tennessee valley, capturing operators and officers at Morristown and Jonesboro. At the latter place we also captured the superintendent of the East Tennessee division lines. At Morristown, Jonesboro and Greenville we pressed these Rebel operators into service, working them under a guard of two men and one lieutenant in each office, and doing all business in cipher, the lieutenant having the cipher key. In this way we opened a line of 126 miles in five days after first striking London Bridge.

"General Burnsides considered this quite an achievement and was highly pleased with our operations at Morristown. He then turned his mounted force accompanied by himself toward Cumberland Gap. Here we also found a poorly constructed Rebel line leading from Morristown to Cumberland Gap. I at once employed two men, and under a guard of fifty cavalrymen we followed Burnsides to the Gap from the south side, while Tidd was following De Coursey's brigade from the north side. We reached the Gap in two days repairing the Rebel line and keeping up with Burnsides. As soon as Burnsides reached the south side of Cumberland Gap he sent couriers across the mountains to ascertain De Coursey's whereabouts and found that the latter had arrived on the north side and had already taken a position with his artillery to commence shelling the Rebels under General Frost in possession of the Gap. Burnsides sent a flag of truce to General Frost demanding an immediate and unconditional surrender. As the Rebel general was hemmed in on both sides with no means of escape he knew it was only a matter of time so he surrendered at once. We connected the lines across the mountains, the same day meeting Tidd's party on top of the mountain, so that in about eight days after reaching East Tennessee we had over 200 miles of wire working in that part of the state, and communication open with all northern points. A few days afterward we returned to Knoxville and opened direct communication with the War Department at Washington, General Burnsides sending greetings to the President of his safe arrival and entire occupancy of East Tennessee.

"I do not believe that even General Anson Stager ever knew of our rapid movements in Eastern Tennessee at that time and probably he is not aware of it at this writing. I made a report to Captain Bruch at the time and do not know whether he ever mentioned it to higher authority, but Captain Bruch always appreciated our important services on that occasion. In these movements I received great aid from General Hartzoff's chief of staff (who was an old operator) and part of the credit should belong to him. I remained in charge in Eastern Tennessee until about the middle of November, 1863, when I received a telegram from Canton to come home immediately as my father was not expected to live. I sent in my resignation at once, remaining a few days until Captain Gross reached Knoxville and took charge of affairs. I turned everything over to him, took affectionate leave of my men and operators and started alone across the East Tennessee mountains. Some of the men in the construction department did not like the looks of

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Captain Gross on account of his pompous and stylish ways, but I told them he was a number one fellow. On arriving home I found my father still living, and by a few weeks good nursing he was restored to health. I then returned to Louisville and reported for duty, but as my place had been filled I was again engaged as military and cipher operator in the Louisville office, which position I held until the fall of 1864, when I was called home to my father's deathbed.

"In the fall of 1862, after the famous retreat of his army from Bridgeport, Ala., to Louisville, Ky., General Buell was very uneasy regarding his supply train, which was still somewhere between Louisville and Nashville, and in the rear of Bragg's army, which had advanced to within five or ten miles of Louisville. At this crisis he asked for volunteers among the telegraph corps who would undertake to penetrate through Bragg's lines, repair one wire as they went and try to establish communication with his wagon train which he supposed should be near Elizabethtown about thirty-five miles south of Louisville. This train had a cavalry guard of about 5,000 men, but, of course, would have been easily captured by Bragg's army had they been aware of its position. I volunteered to go on this perilous expedition, being furnished with a light handcar and four strong men to propel it. We started down the Louisville and Nashville Railroad right into the face of Bragg's army, but met with nothing unusual until we reached Salt River, 20 miles out. Here the iron railroad bridge had been destroyed and all the wires cut. We immediately repaired our wires, dragged the handcar across on the ruins of the bridge and proceeded on our way.

"Two miles beyond we came in sight of a Rebel camp near the road on our left, with a picket on the track. As we were dressed like section hands I told the men to pull ahead with all their power and never stop even if halted. The guard got out of our way without even saying a word or halting us, and fortunately they had not disturbed the wires. After this we met no more Rebels, but found wires cut at Rolling Fork River and at Muldras Hill. We reached Elizabethtown about five p. m., and finding the circuit from Louisville, communicated with Buell's headquarters. About an hour afterwards the advance guard of the last wagon train came into town, and received orders by telegraph from Louisville to turn west to the Ohio River where steamboats would meet them to transport them to Louisville. This finished my mission, which had proved entirely successful.

"We remained at Elizabethtown until the next morning, when we found the line cut, and knowing that the Rebels had found out our object and would be looking for us I advised leaving the hand car, and starting back on foot, single file along the railroad. I kept some little distance ahead looking out for the enemy. And we passed along safely until near Lebanon Junction, when suddenly about fifty of Morgan's men rode out of a neck of woods, not more than forty rods above us, and came toward us at a gallop. The men started to run for a cornfield, but as I saw at a glance that they would catch us before we reached it, and as the road here had an embankment about seven feet high, I went down behind the embankment and ran directly toward the Rebels on the opposite side of the road in a stooping position. In this way they missed seeing me, and when they crossed the track to chase my men, I crossed to the side of their first appearance and started for the same neck of woods from which they had emerged. Here there was about twenty rods of open woods, then a fence and thick brush beyond. I knew if I could gain the brush that I would be safe. I climbed over the fence just in time as two cavalry men were close behind, and had commenced firing at me.

"After I gained the brush I had the advantage of seeing them without their seeing me, and they gave up the chase. I then moved up the road and went across the country to a Union man's house, where I remained until the next morning, when I again started, this time keeping along in the woods and across farms some distance from the road. At noon I had entered a farmhouse by the back way when a negress met me with, 'Lawd, Massa, you just make yourself scarce here, for the front room am full of Rebs.' I peeped through a crack and found this the case, so I retreated in good order for the wood again. When I reached Salt River there was no way of crossing it except by the railroad bridge at Shepherdstown, and this place I found was occupied by a brigade of Rebels. As I was inside their lines, however, I had to get out some way. So I waited for night and darkness and succeeded in getting through their picket lines to the bridge and the town. I went to the hotel and took supper by the side of Rebel officers representing myself as a good Rebel citizen, of course. I remained until ten o'clock and then started to try and get through their lines on the north side of town. I found the pickets so near each other, however, that I failed getting past them until towards morning when I found a patch of high weeds and crept on my hands, or rather flat on my stomach through their lines within two rods of a picket. I had to move as sly as an Indian so they would not hear and discover me, for had they captured me I would have suffered, as I had a pocket instrument and important papers for General Buell. I met or dodged their cavalry scouts half a dozen times that day as they were on every road and byway. About five p. m. I finally reached our picket lines five miles out of Louisville. I was a hard-looking object, my shoes being torn and my coat and trousers all in tatters from the thorns and brush, but I returned with a whole hide, nevertheless. Captain Bruch and the boys greeted me with enthusiasm as they had given me up for lost, or captured. We learned a few days afterwards that they had captured the four men who had

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been with me, but they were paroled afterwards, claiming that they were section men on the railroad. This was the hardest trip and narrowest escape I had during the war, though I had a good many similar experiences.

"At the Battle of Perryville, in Kentucky, we had come up on the right wing of Buell's army with the line, and during the day a Rebel scouting party surprised us, but myself and men escaped with the loss of all of our baggage. The day after the battle General Buell ordered me to proceed with the line along the Lebanon Pike, to Danville. We reached Danville next day about eleven a. m., but found none of our troops anywhere near. I opened an office on Main street in the upper story of a building and had started work when a Union man came rushing in with the expression, 'My God, boys, you had better get out of this!' Upon asking him the reason, he replied that General Bragg's army was just below town on the Lexington Pike and coming our way. I told the boys to leave, and packing my instruments in a box, carried them up into a garret. I then took my horse and went to the hotel to await events. By this time the Rebel advance was marching through town, and I found it to be General Breckinridge's corps. I remained on the streets looking at them the same as other citizens, sometimes in conversation with the officers. It was three p. m. when the rear guard came up. These were mounted and skirmishing with Wolford's cavalry. Wolford made several charges at them down throughh the streets, when the Rebels would turn and charge back, our cavalry retreating so that it became quite lively for a while. By five p. m. General Thomas's corps advanced through town chasing the Rebels. I had no fear of being captured while the Rebels held the town as my dress resembled a Rebel's more than a Union man's.

"I was captured once by Morgan's men in Kentucky, but being in citizen's dress and with a particular friend of Morgan's, was not molested any further than Morgan's saying, 'Don't let me catch you again, for we shall certainly hang you.'"

Book Reviews.

"Wireless Telephone Construction," by Newton Harrison (Spon and Chamberlain, New York, 74 pages, 43 illustrations), is a comprehensive description of the apparatus necessary for constructing a simple wireless telephone outfit. The author describes briefly the principles involved in the transmission of articulate speech through the ether, the apparatus required to produce the transmitting waves and to receive them together with a somewhat detailed description of the construction of the various units making up the system. This book should prove important and useful to those who are interested in the development of the art of wireless telephony and do not care to attempt to master the complex theories involved. Price 25 cents. Orders will be promptly filled if addressed to J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

Probably the most complete and authoritative book upon the history and development of submarine cables is "Submarine Telegraphs, Their History, Construction and Working," by Charles Bright (Crosby, Lockwood and Son, London, 780 pages). The author of this exhaustive work, by reason of his long association with submarine telegraph interests and the active part he has taken in the work of cable laying, testing, etc., following in the footsteps of his father, Sir Charles Bright, who was undoubtedly the original submarine cable engineer of the world, is especially qualified to write the history of the art, and no cable engineer can afford to be without a copy of this book. In Part I, which deals with the history, Mr. Bright tells of the early attempts at subaqueous telegraphy; the first effective cable across the English Channel in 1851; the attempts which were made at laying the Atlantic Cable before success was finally achieved; the rapid spread of submarine cable systems to all countries; personal sketches of many of the engineers prominently connected with the development of the cable, and of the effect of the telegraph and of submarine telegraphy on civilization. In Part II, which deals with the construction of the cable, he takes up successively the conductor, its physical and electrical properties, form of conductors, size and methods of manufacture; the insulation, early methods employed; gutta-percha, where and how obtained, chemical, physical, mechanical and electrical properties and methods covering the conductors; india-rubber, relative merits of india-rubber and gutta-percha; other insulating materials suggested; cable splicing; mechanical protection, metal tape, jute, iron wire, hemp, yarn and cord and other forms of protection with methods of applying them, and specifications and tests for the completed cable.

In Part III, dealing with the working of submarine cables, Mr. Bright outlines the theory of the transmission of signals through cables; speed of signalling; apparatus used for cable operation, duplex telegraphy on cables; automatic machine transmission and proposed methods for increasing the speed of working.

Over two hundred and fifty illustrations are found in its seven hundred and eighty pages, and the book is handsomely bound in a specially designed cover with beveled edges. As the author deals with his subject from all points of view, political and strategical, as well as scientific, the work should be of interest to the general public as well as to engineers. The price of this superb volume is $25, and copies may be obtained by addressing J. B. Taltavall, Telegraph Age, 253 Broadway, N. Y.

Telegraph Age is the leading journal of its class in the world, and should be in the hands of every progressive operator; $2 a year.

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Obituary.

George H. Harris, aged forty-seven years, of Rochester, N. Y., died May 22.

Wellington W. Chancey, a telegraph operator attached to the sixth recruiting company at Fort Slocum, New York, and a native of Georgia, committed suicide by inhaling gas on June 4.

Thomas Armour, aged seventy-three years, an old-time telegrapher and a member of the United States Military Telegraph Corps during the Civil War, died at Pittsburg, Pa., on May 27. Plum's "Military Telegraph in the Civil War" relates of Mr. Armour that during an engagement at Point of Rocks, Md., in 1861, he remained at his key transmitting messages relating to the battle although the shells from the enemy's guns were falling all around him. He was the last to leave when the retreat took place. He has lived in retirement for the past ten years.

Charles L. Buckingham, who was for many years patent attorney for the Western Union Telegraph Company, died in New York May 31 of cirrhosis of the liver after an illness of about five weeks. He was known as a specialist in patent law, having been counsel in patent and electrical cases for the Western Union Telegraph and other companies. He was born in Berlin Heights, Ohio, in 1852, and was graduated from the University of Michigan, at Ann Arbor, in 1875. Mr. Buckingham was a well-known member of various scientific and electrical organizations.

J. A. Brenner, aged eighty-one years, until 1902 and for the previous forty years, superintendent of the Western Union Telegraph Company at Augusta, Ga., died on June 1. Mr. Brenner had been in feeble health for some years past, his end therefore was not unexpected. Mr. Brenner began his telegraph career in 1849 in the Washington, D. C., office of the Bain line. In 1855 he took charge of the Washington and New Orleans Telegraph Company's interests at Augusta, Ga., and a year later he was made district superintendent, which position he held until his retirement with the exception of five years during the Civil War, when he was identified with the Southern Express and other telegraph interests.

Alonzo J. Esken, for some years past identified with the Postal Telegraph-Cable Company at San Francisco, died on May 31 as a result of injuries sustained from a fall while attempting to board a moving street car. Mr. Esken was born at Urbana, O., in 1862, and had worked as a railroad telegrapher for several of the railroad systems and in the commercial offices at Chicago, New York, Montreal and Vancouver, for both the Western Union and Postal Telegraph-Cable companies in the United States and the Canadian Pacific in Canada. Mr. Esken was regarded as an unusually capable telegrapher, and for some time previous to his death had worked the Commercial Cable Company's land wire between San Francisco and New York. He is survived by his wife and one son.

Orry M. Shepard, a member of the executive committee of the Society of the United States Military Telegraph Corps, and an old-time telegrapher and railroad official, died at New Haven, Conn., on June 1. Mr. Shepard was born at Cleveland, O., in 1842, and entered the telegraph service in 1857. In 1863 he entered the military telegraph and railroad service of the government, where he remained until the close of the war. Going west in 1865, he became a train despatcher, and, arising through various grades, finally reaching the positions of superintendent of telegraph, master of transportation and assistant superintendent and assistant general superintendent of the St. Louis and Southeastern Railroad. He later entered the employ of the New York, New Haven and Hartford and became successively division superintendent, assistant to the president, general superintendent and finally general assistant, which position he held at the time of his death. An engraving and biographical sketch of Mr. Shepard appeared in our September 16, 1908, issue.

United Press Election.

The directors of the United Press at their annual meeting held in New York on May 31, elected the following officers: President and chairman of the board of directors, H. B. Clark; first vice-president, C. D. Lee; second vice-president, Oliver S. Hershman, Pittsburg Press; third vice-president, Andrew McLean, Brooklyn Citizen; secretary, R. W. Howard, and treasurer, C. Price.

The United Press have decided in the future to gather and transmit over its wires news of baseball and other sporting events. This extends the day service over the wires of the association from four to six p. m.

Another postponement has been made on the time set for the hearing of the United Press injunction case against the Associated Press, restraining it from compelling the St. Louis Post-Dispatch, or any other Associated Press paper, to remove the operators and wires of other news services from its office. No date has been definitely decided on for the hearing, and it is very likely that there will be no action taken on it by the courts for perhaps a year or more.

Destruction of Poles by Insects.

Insects play a most important part in timber destruction. The injury done is generally underestimated, as their depredations go on gradually, but forcibly, attracting little observation. When the insects bore into the timber they open up air chambers and channels which make it easy for rain water to seep in, and thus keep the wood in a moist condition. Fungus spores floating through the air are enabled to germinate with greater rapidity and with increased effectiveness,

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and the decomposition of the pole consequently is materially hastened.

Several years ago the Forest Service co-operated with one of the large pole consuming companies in Georgia and Florida to experiment with various preservatives in protecting the butts of poles from decay. These preservatives were simply painted upon the wood, and of course did not sink in to any great depth. A recent examination made of this pole line showed that wherever the preservative had entered the wood no destruction due to insect attack had taken place, but where the wood was unprotected, such injury was frequently quite serious. Poles in which the preservatives had seeped through a crack were often more or less fluted on the surface, that is, the oil saturating the wood in the immediate vicinity of the crack protected it from the attacks of the insects. It is essential, therefore, particularly in the warmer portions of the United States to protect timber from the attacks of insects as well as of fungi, if the longest life is to be secured.

Legal.

The question of jurisdiction of states and of their police power on ground within their borders owned by the government—navy yards, military reservations and the like—has been decided by the Supreme Court of the United States, in the case of the Western Union Telegraph Company vs. Samuel Chiles, in which it was held that the Virginia penalty law for delay in the transmission of telegrams, could not be held to operate on land owned by the government in that state.

Chiles was a gunner at the Norfolk navy yard. He sued the Western Union under a state law of Virginia, providing a penalty of $100 for non-delivery of a telegraphic message. Because the message was addressed to Chiles at the navy yard the Western Union contended that state laws are not applicable on ground owned by the United States.

The Bell telephone interests scored against the long-distance independents on May 20 when Federal Judge Thayer made known his decision in the suit brought by the United States Telephone Company to restrain the American Telephone and Telegraph Company and its subsidiary, the Central Union Telephone Company, from connecting their long-distance wires with certain independents in Ohio and Indiana. Judge Tayler's decision denies the petition of the independents.

This lifts the temporary restraining order granted by Judge Tayler several months ago and permits the Bell companies to connect with independent exchanges wherever a contract can be made with the latter.

The Hudson Word Counter Again on the Market.

Every telegrapher who operates a typewriter should have it equipped with a Hudson Word Register, which is now placed on the market by a manufacturing house which has the reputation of producing the very best material and goods of a superior quality. This simple yet accurate device for counting words written upon the typewriter is easily read, instantly set and has a recording capacity up to 1,500. It unerringly registers the number of words written and thus obviates entirely the necessity and annoyance of counting checks. It can be supplied with attachment for any standard make of typewriter. The device is made in compact form, carefully finished and is an ornament as well as a labor saver. The price of this useful article is $5.00 and orders may be sent to J. B. Taltavall, Telegraph Age, 253 Broadway, New York. Orders should state what make of machine it is to be used on as attachments differ.

American Telephone and Telegraph Notes.

Mr. Lee E. Whitmore has been appointed chief test board man at Nashville, Tenn.

Mr. D. L. Robeson has been transferred to Kansas City, where he takes a test board trick.

The positions in the St. Louis test room vacated by the foregoing changes are filled by Mr. Chas. C. Liggett, transferred from Louisville, Ky., and Mr. Oren M. Williams.

New Lines of Telepost Company.

The Telepost Company has completed a telegraphic line between St. Louis, Sedalia, Mo., Springfield, Ill., and Terre Haute, Ind., over which commercial business is now being transacted. The line will be extended as soon as possible to include Indianapolis, Chicago and Kansas City. The company utilizes the facilities of independent telephone companies in addition to its own lines now in course of construction under the direction of W. H. McCollum.

General Mention.

The American Institute of Electrical Engineers will hold its twenty-sixth annual convention at the Hotel Frontenac, Thousand Islands, N. Y., on June 28, 29, 30 and July 1.

The third annual convention of the Order of Railroad Telegraphers, Despatchers and Signalmen was held in Philadelphia beginning May 17. Forty-seven divisions were represented and routine business only was transacted.

According to the statement of one of the city officials of Peoria, Ill., a new bridge is badly needed in that city, and counsel has decided to make an attempt to collect from the two telegraph companies the sum of $28,000 now, it is claimed, due that city under a penalty of $200 per day each for non-compliance with the law ordering the companies to have their wires buried from the first day of January, 1909.

On May 14 the work of the Edinburgh Postal Telegraph Department was interrupted by the effect of earth currents. The currents made themselves felt about four p. m., and for an hour in-

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creased in strength steadily. Between five and six p. m. they decreased, and shortly after six o'clock they disappeared, but returned again at nine o'clock, having travelled south, and affected communication with Bristol.

The Alaska-Yukon-Pacific Exposition was opened by President Taft at 12:30 p. m., June 1. By pressing the gold telegraph key which we described in our May 1 issue, the President operated a relay and caused five strokes to be given on a large bell placed on the stage of the amphitheatre at the Exposition grounds. At the same time another relay operated and closed a circuit which by means of solenoids, caused two of the largest whistles in the city to blow and thus announce the opening of the Fair. Another relay opened the shutter of a camera and took a photograph of the audience in the amphitheatre. At the same instant Mayor McClellan received the signal at the City Hall in New York and pressed the trigger of a revolver, which started the international automobile race from New York to Seattle.

J. Frank Howell, banker and broker, of 34 New street, New York, and a former well-known telegrapher, has issued an interesting booklet in which he sets forth in a readable and concise form a number of Wall street practices, and points out the possibilities in trading in stocks on margin as well as the dangers attendant upon this form of speculation, together with some very good advice against dealing with bucket shops. Mr. Howell, who is one of the most enterprising, and at the same time, one of the most conservative brokers on the Consolidated Exchange, will send a copy of this booklet free of charge to anyone interested, and it is to be hoped that in his commendable efforts to protect and further the interests of his customers and the public at large in operating in Wall street, he will achieve a large measure of success.

Education for Employes.

Demanding the best engineers in the world and ever seeking for the most skilled workmen, it is not strange that the managers of the electrical industry should be among the pioneers in adopting a system for educating their employes.

The General Electric Company has a shop apprentice school system. This system, which was established seven years ago, but was lately put on an improved basis, gives instruction in machine shop work, tool making, pattern making and foundry work.

Four years of apprenticeship are required. An applicant must be sixteen years of age, able to speak, read and write English and pass an examination in arithmetic, including fractions, for shop apprenticeship and in advanced arithmetic for drafting apprenticeship.

Apprentices are paid nine cents per hour the first year, twelve cents the second year, fourteen cents the third year and sixteen and one-half cents the fourth year, and a cash bonus of $100 is given at the end of the term.

Graduates of high schools, or those who have completed a three-year course in such schools, may have their apprenticeship period reduced one year.

Educational courses are provided by the General Electric Company, with regular school rooms and competent instructors recruited from the public schools. Academic branches are taught which will assist the apprentices to obtain a better understanding of machines and machine parts, and will make them acquainted with the problems and calculations connected with the reading and comprehension of mechanical drawings, and with the sketching and designing of auxiliary tools needed in modern manufacture.

The school sessions are held during the working hours, and the apprentices are paid the same wages during these hours which they would receive if they were working in the shops.

The course of study in the school sessions comprises arithmetic, mensuration, elementary algebra, elementary trigonometry, elements of machine design, power transmission, strength of materials, mechanism, elementary electricity, mechanical drawing and jig and fixture designing.

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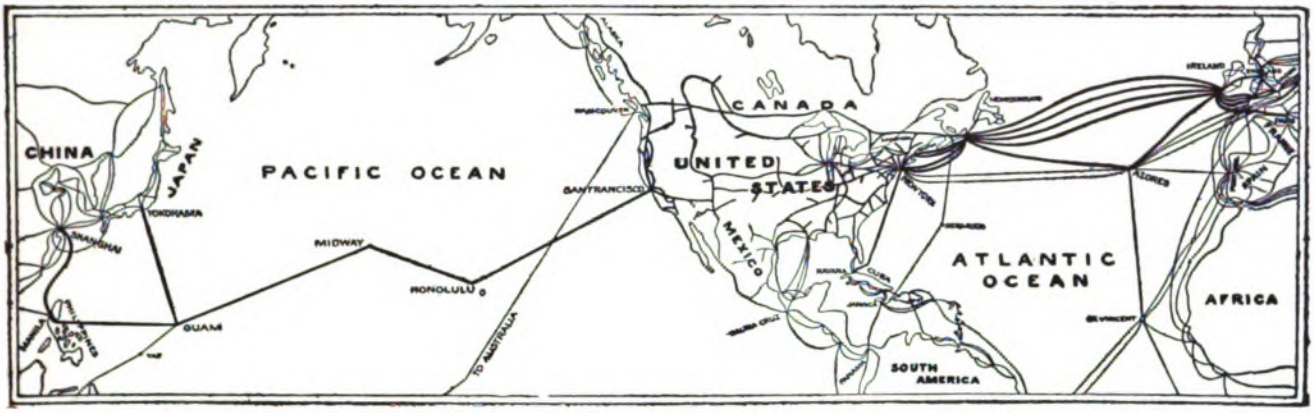

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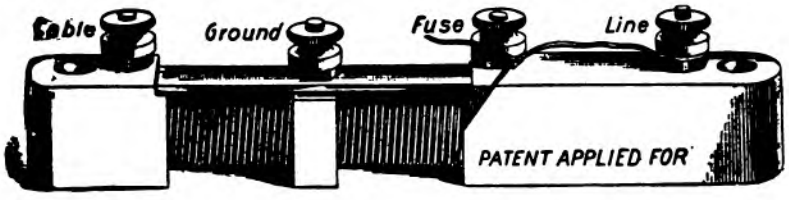

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