TELEGRAPH AGE

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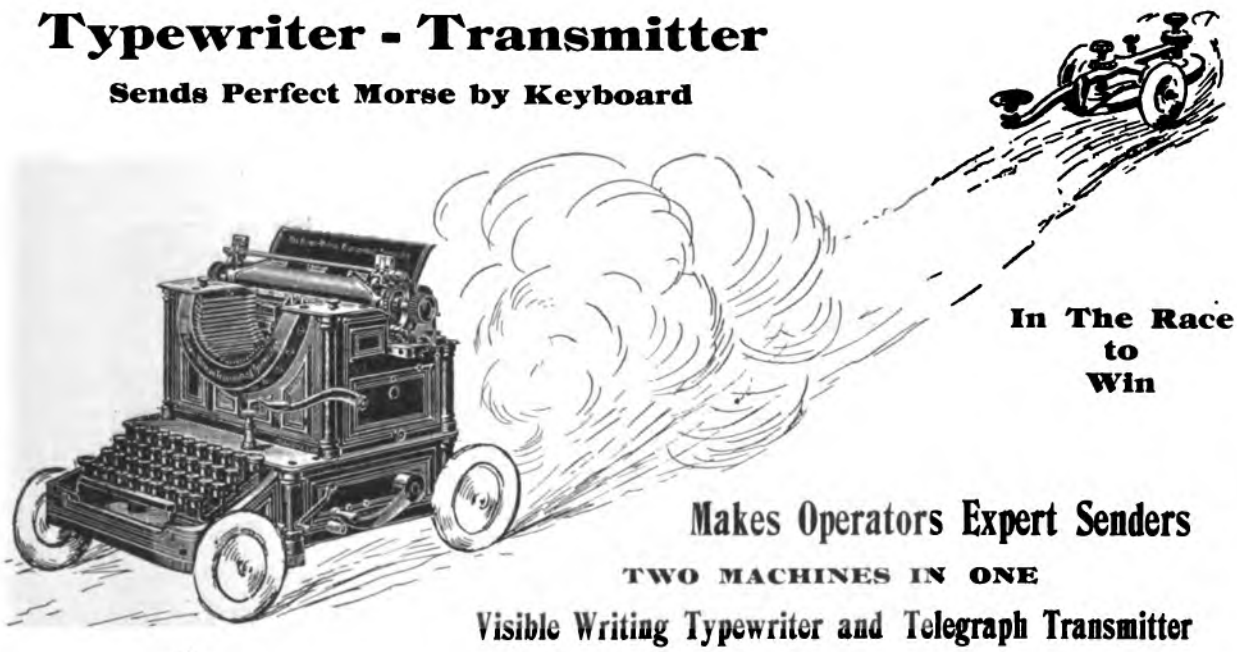
THE YETMAN

Typewriter - Transmitter

Sends Perfect Morse by Keyboard



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The YETMAN TYPEWRITER-TRANSMITTER CO. is manufacturing this combined machine at North Adams, Mass., where it owns outright a four-story factory building with as complete an equipment for typewriter manufacture as there is in any part of the world.

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Box 25, North Adams, Mass.

TELEGRAPH AGE

No. 11. NEW YORK, JUNE 1, 1908. Twenty-fifth Year.

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SOME POINTS ON ELECTRICITY.

A Study of the Duplex Circuit.

BY WILLIS H. JONES.

Sometimes a very simple problem furnishes an interesting and instructive subject for discussion, especially among laymen. Recently a number of operators interested in the workings of multiplex apparatus had quite an argument among themselves over the question "What does the rheostat resistance obtained in balancing a duplex represent?" followed by other questions as to the means of determining by the balance the actual resistance of the wire itself, and to what extent the joint resistance of the artificial line and battery resistance play a part in the calculations.

Now, this is really not a difficult problem to solve if one stops to consider the facts in the case, but owing to the various points of view expressed by those entering into the discussion the conclusions arrived at in some cases were, to say the least, confusing.

For the purpose of illustrating the problem, let us refer to the accompanying diagram, Fig. A, with the different resistance values in the circuit marked out, and which represents the conditions cited when 2,000 ohms were required in the rheostat to balance the duplex apparatus. It was also stated that the distant station likewise balanced to 2,000 ohms.

Now some of the laymen contended that the 2,000 ohms in the rheostat represented the resistance of the multiplex circuit from X in the home apparatus to X' in the distant set. Others held that it measured the total resistance of the main line current, while a few rightly claimed that it represented the actual resistance of the external circuit; that is to say, all of the resistance which lies beyond the home relay—in still plainer words, the combined resistance of the main line wire proper, that of the distant main line relay coil, and the joint resistance of the distant battery and the artificial line circuit at that point.

To show the logic in this latter statement let us compare the relations that the multiplex battery, relay coils, and rheostat hold to each other with that of an ordinary wheatstone bridge and galvanometer outfit, as shown theoretically in Fig. B.

In this diagram the resistance coils A and B,

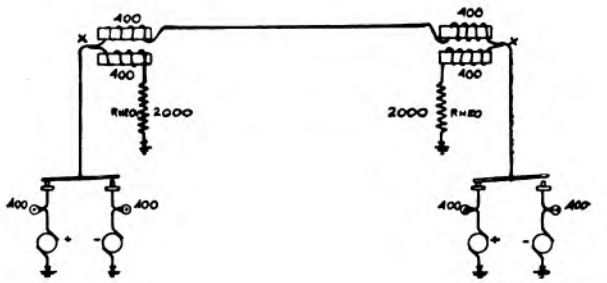


FIGURE A.

which in this case are made equal, represent the arms of the bridge, to which is connected a battery containing, of course, a resistance. The galvanometer is connected across the arm terminals at C and D. When a wire is connected to the terminal of arm X—C, and a rheostat to arm X—D, no current will flow through the galvanometer provided we balance the two circuits by inserting as much resistance in R as the line L contains. Hence when the needle stands at zero we know that the resistance of the rheostat indicates the resistance of the line, or external circuit. The value of the resistance in the arms makes no difference in the calculation whatever, provided it is identical in each arm. Whether we make it 100 or 1000 ohms the resistance in the rheostat required to balance the line will be the same.

Now, if we look closely at Fig. A it may be seen that the connections are very similar to those in the wheatstone bridge arrangements. The battery divides between the two evenly wound 400 ohm coils

of relay, which latter thus act in the capacity of the two arms of a wheatstone bridge, the main line wire being connected to one arm, or coil, and the rheostat to the other. When the resistance in the latter is made equal to that of the external circuit, the balance is complete, and here, as in the former case, R represents the resistance of the external circuit beyond the relay coil or "arm." In like manner we might substitute a 1,000-ohm coil relay similarly wound for the ordinary instrument, without altering the home balance in the least, but the change would, of course, throw the distant station out of balance. This proves conclusively that the home relay must not be considered in the calculations, as would be the case if R represented the resistance of the multiplex circuit from split to split.

Concerning the part the artificial line plays in a multiplex circuit it is obvious that its presence or absence, as the case may be, can alter the total resistance of the line side, but a comparatively few ohms. In the circuit shown in Fig. A, for example, the joint resistance of the artificial line 2,400 and the 400-lamp or battery resistance, is about 343 ohms, a difference of but 57 ohms from that of the lamp, and a factor so small in comparison with the rest of the circuit as to be prac-

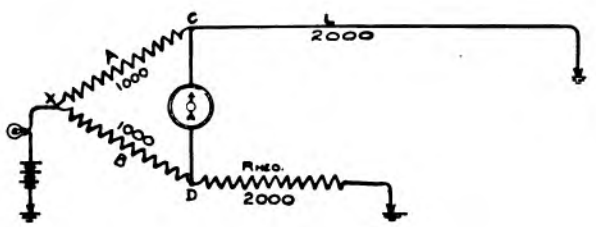


FIGURE B.

tically negligible. Even though the balance in wet weather should fall to 1,000 ohms the reduction due to the joint resistance then would not shorten the circuit quite 100 ohms. In any case where the circuit is good enough to be duplexed successfully, the artificial line will always be found to contain sufficient resistance to prevent the diversion of any appreciable part of the incoming current through that channel.

When, however, it comes to the problem of measuring the electromotive force of a distant multiplex battery with the apparatus at that terminal in circuit, the resistance of the artificial line does play a very important part. In fact, its connection in the circuit prevents the voltmeter from disclosing the value of any pressure beyond the "split" X', (Fig. A) for the reason that it acts as a leak and causes a "drop" in the voltage where the line proper is connected.

It is obvious then that in order to correctly measure the voltage of a distant multiplex battery with a voltmeter, or calculate the same by ohm's law from the current and resistance indicated, the actual conditions existing in the circuit should be thoroughly understood in advance.

(To be continued.)

Recent Telegraph Patents.

A patent, No. 886,338, for a printing telegraph, has been awarded to John C. Barclay, of New York. A printing telegraph system of the stock-ticker type having means for operating a two-wire ticker or printer circuit from a distant transmitter by means of a single line circuit. Has repeating means whereby signals may be repeated into a further line circuit for operating tickers or printers.

A patent, No. 886,339, for an automatic telegraph transmitter, has been taken out by John C. Barclay, of New York. Automatic telegraph transmitters of the type in which the transmitting mechanism is controlled by a suitably marked or perforated message strip. Provides means whereby it is impossible to throw the hand transmitter into circuit without simultaneously stopping the feed of the message tape.

A patent, No. 886,355, for an invisible electric burglar and fire alarm, has been issued to James W. Dawson, of Kansas City, Mo. Relates to electric alarms, and more particularly to invisible burglar and fire alarm systems, which will be operated through the opening of the door or by a person walking against a thread stretched in such a position that it cannot be avoided.

A patent, No. 886,755, for a telegraph instrument, has been granted to Benjamin F. Bellows and Ambrose Behner, of Cleveland, Ohio. Has a key by which one movement will make dashes and another movement will release automatic mechanism to make dots until the return of the key to the normal position cuts off the dots. Makes use of vibrating pendulums having a different periodicity of movement.

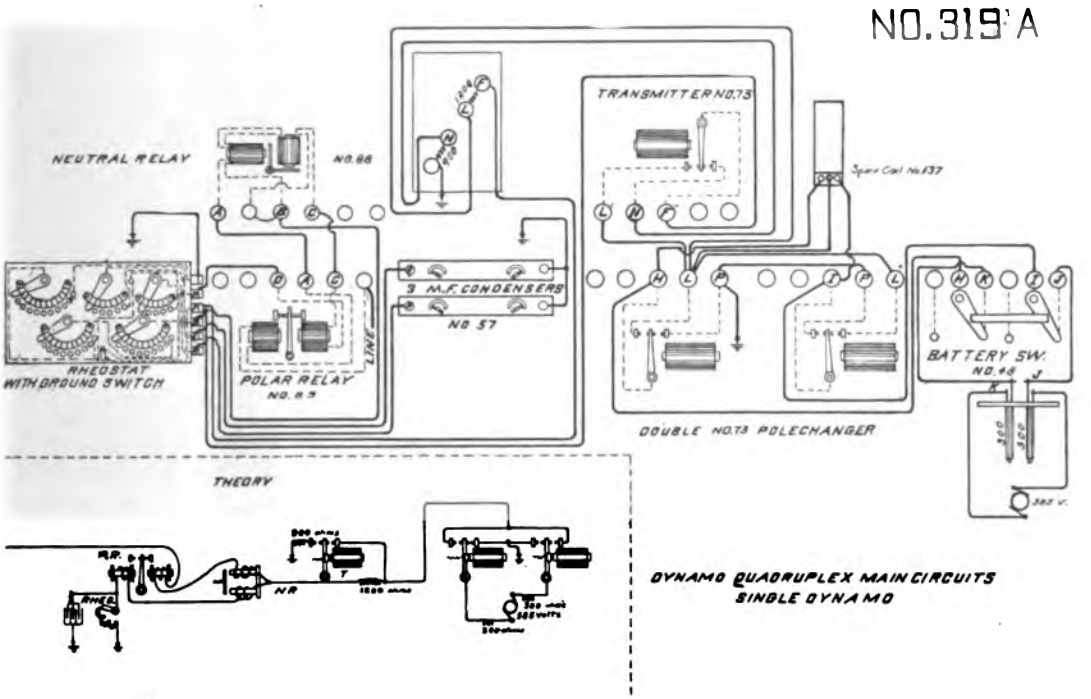
A patent, No. 887,038, for a duplex telegraph, has been issued to John J. Ghegan, of Newark, N. J. A duplex system having differential or double wound relays and designed to have one or more intermediate stations in the circuit, and to duplex an ordinary way circuit for all or only some of the offices on the line.

A patent, No. 887,313, for telegraphic apparatus, has been issued to Frederick G. Creed, of Glasgow, Scotland. A telegraphic receiving apparatus is provided with a tape-feeding mechanism and a tape-punching mechanism controlled in accordance with the electrical impulses received.

Mr. E. A. Chenery, superintendent of telegraph of the Missouri Pacific Railway Company, St. Louis, Mo., in a recent letter, expresses his opinion of Telegraph Age in the following paragraph: "I am pleased to enclose a check to cover my renewal of subscription to Telegraph Age, and wish to say that I know of no other investment that furnishes such satisfactory returns for the small outlay. If your very valuable journal was placed in the hands of every operator in the country I feel sure the conservation of telegraph timber would be assured."

The Postal Single-Dynamo Quadruplex.

This journal will publish from time to time illustrations of apparatus in use by the Postal Telegraph-Cable Company. An explanatory sketch, written by John F. Skirrow, associate electrical engineer of the company, will accompany each presentation, in which the special instrument pictured will be considered in its application to the needs of the company. The series promises to be one of intense interest to a wide circle of readers, and its appearance in these columns will doubtless be eagerly welcomed.



The accompanying diagram illustrates the manner of operating a quadruplex from a single dynamo machine as used by the Postal Telegraph-Cable Company. It often happens that it is desired to use dynamo current for the operation of a quadruplex, but the service is such that it would not be economical to set up the regular standard dynamo equipment for this work. Where a single quadruplex is required, and it is used only a part of the time, a single dynamo machine worked on the plan shown provides a very simple, efficient and economical means for operating it.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Edward B. Pillsbury has been appointed general superintendent of the Eastern division, with headquarters at New York, vice E. G. Cochrane, retiring because of failure in health, effective June 1.

Mr. Leonard W. Storror, after almost half a century of active work in the telegraph service, will relinquish, on June 1, the arduous duties of general superintendent of the Pacific division, and will, after that date, serve the company as its representative for the Pacific coast, continuing his headquarters in San Francisco.

Mr. Jed G. Blake, now Mr. Storror's assistant, has been appointed general superintendent of the Pacific division, effective June 1.

Mr. Edgar W. Collins, superintendent at Cleveland, O., whose long continued illness, which at times caused him to seek hospital treatment, and which has occasioned his friends serious apprehension, has about recovered his health, and is able once more to attend to the duties of his office as formerly.

Mr. William A. Porteous, manager of the New Orleans office, has just passed a creditable examination in the law department of the Tulane University of Louisiana, and now awaits admission to the bar of his state.

The new office at Pittsburg, because of its up-to-date appointments, is attracting a great deal of attention both in and out of the service. Numerous members of the telegraph fraternity have visited the office and have become interested inspectors of all its details. Among Postal officials who have recently viewed this plant may be mentioned E. B. Pillsbury, general superintendent, New York; T. W. Carroll, division superintendent, Chicago; J. F. Looney, division electrical engineer, Chicago; J. P. Edwards, division electrical engineer, Atlanta; F. E. d'Humy, assistant electrical engineer, New York; S. B. Haig, superintendent of traffic, New York, and Charles Shirley, assistant superintendent of traffic, New York.

RESIGNATIONS AND APPOINTMENTS.

William H. Reagan, for many years manager at

Fall River, Mass., has returned to that place in the same capacity, vice B. F. Gayton, transferred to Boston. John J. Welch has been appointed chief operator.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

George O. Smith, of Cleveland, O., was a recent visitor.

City Superintendent M. W. Hamblin, who has been absent on vacation leave, is again at his desk.

Barclay printers have recently been installed on the Chicago-Detroit, Pittsburg-Cleveland, and Philadelphia-Washington circuits.

For the fourteenth consecutive year the memory of Morse was fittingly observed on Memorial May, May 30, by the decoration of his monument in Central Park, New York, with flowers. This tribute of respect and love was performed by Marion H. Kerner and others, acting in behalf of those whose contributions for the purpose each year make such demonstration of remembrance possible.

The offices of the executive department wear a busy air these days, so much so as to especially impress the caller thereto. The officers, from Colonel Clowry, the president and general manager, to his near neighbor, J. C. Barclay, assistant general manager and electrical engineer; the vice-presidents, Mr. Van Every, Mr. Clark and Mr. Atkins, whose apartments are just beyond, besides Mr. Brewer, the secretary, and Mr. Fearons, the general attorney, not omitting Mr. Bristol and his assistant, Mr. Swortfiger, of the construction department, all on the same floor, have an atmosphere about them of intense application. And so it is throughout the big building, all are busy, observing hours that are early and late.

Personal.

Mr. John B. Bertholf, manager of the Western Union Telegraph Company, Jersey City, N. J., was elevated to the position of grand commander of the Knights Templar of New Jersey, at the annual convention held at Trenton, that state, on May 12.

Mr. Clarence H. Mackay, president of the Postal Telegraph-Cable Company, New York, in addition to $100,000 for the Mackay School of Mines, $30,000 for the John W. Mackay statue and $50,000 for campus improvements at the University of Nevada, at Reno, Nev., has announced further benefactions for the furnishing of the school of mines and an annual contribution of $6,000 for the maintenance of the school.

Mr. B. E. Sunny, a former Chicago telegrapher, who recently resigned as vice-president and Western manager of the General Electric Company, was elected president of the Chicago Telephone Company, on May 13, succeeding Mr. Arthur D. Wheeler, who becomes chairman of the board of directors. Mr. Sunny is also vice-president of the American Telephone and Telegraph Company and a director of the General Electric Company.

The Cable.

On the occasion of the fortieth annual meeting of the shareholders of the Indo-European Telegraph Company, held recently at London, J. Herbert Tritton, chairman of the company, with which he has been associated since its organization, was presented with a substantial token of the high regard in which he is held by his colleagues, and by the home and foreign staff.

Cable communication is interrupted May 27, with:

Venezuela Jan. 12, 1906.
Madura Island (Dutch East Indies) Feb. 3, 1908.
Island of Lanzorote (Canary Islands) May 18, 1908.
Steamer from Las Palmas.

The Mexican Telegraph Company, in its annual report for the year ended December 31, 1907, gives total receipts of $1,047,531, with total deductions of $182,163, leaving net earnings of $865,368, equal to thirty per cent. on the $2,879,100 of capital stock outstanding. Dividends of $287,010 were declared, leaving a surplus of $578,358, which, added to the previous surplus, gives a net surplus of $2,381,895.

The Central and South American Telegraph Company, in its annual report for the year ended December 31, 1907, gives a gross income of $1,749,045. Expenses were $556,666, and the net of $1,192,379 is equal to 11.9 per cent. of the $10,000,000 of capital stock. Dividends of $551,031 were declared, leaving a balance of $641,348. Adding the surplus of $607,936 to the previous surplus, gives a total surplus of $2,478,386, as compared with $1,870,450, for 1906.

Charles Henry Reynolds, aged sixty-four years, general manager of the British Pacific Cable Board, and a delegate to the International Telegraph Conference, died in the hospital at Lisbon, Portugal, on May 21. Mr. Reynolds entered the telegraph service in India, in 1866, after studying at the University College, London. He held many high positions in the telegraph service in India, and represented that country at the Berlin Telegraph Conference, in 1885. For ten years he was director-general of the Indian telegraphs. In September, 1901, he was appointed general manager of the Pacific Cable Board, and in this capacity in a tour of the world, was successful in promoting the interests of the all-British Pacific cable system. He was well known in telegraph and cable circles throughout the entire world. A year ago he visited the United States and Canada on business connected with cable interests.

Mr. Pillsbury, General Superintendent of the Postal Telegraph-Cable Company.

Edward B. Pillsbury, who, on January 1 of this year, was transferred from the superintendency at Boston to the division superintendency in New York, has been promoted to be general superintendent, vice E. G. Cochrane, who has retired on account of continued ill health. Mr. Pillsbury is a man of ability, has had a long and varied experience as a telegrapher, and possesses a close familiarity with the business

EDWARD B. PILLSBURY.
General Superintendent, Eastern Division, Postal Telegraph-Cable Company, New York.

in all of its details. He was born at Belfast, Me., May 3, 1856. When but nine years of age he became a messenger in the service of the American Telegraph Company, in his native place. Apt, and always of an observant nature, he readily learned to telegraph, and acquired much rudimentary acquaintance with the business for one so young. At twelve years of age he was placed in charge of the Western Union office at Belfast, two years later being transferred to Bangor, and there assigned to The Associated Press wire. During the two years following he employed his leisure time in pursuing his studies under the guidance of a private tutor, who fitted him to enter the Maine State College at Orono, when sixteen years of age. Young Pillsbury was a painstaking student, and for the two years he remained in the college showed much industry, working as an operator during times of vacation. Leaving college he went South, and for a year was employed as an operator by the Southern and Atlantic Telegraph Company at Montgomery, Ala. In 1875 he located at Boston, there entering the Western Union service under Manager George F. Milliken. Mr. Pillsbury had developed into an expert operator. Always of a studious and thoughtful disposition he became as close a student of the technique of his profession as he had previously displayed in his college course. For four years he was engaged on the night force under the immediate direction of E. F. Leighton, the night manager of the office. In 1879 Mr. Pillsbury received the appointment as chief operator in the Boston office of the American Rapid Telegraph Company, his promotion to the managership occurring in 1882. He subsequently entered the employ of the Bankers and Merchants and the United Lines telegraph companies. His connection with the Postal Telegraph-Cable Company dates from 1886, entering its Boston office as chief operator. In 1891 he was made manager. On February 15, 1894, he was promoted to be assistant superintendent, his further advancement to the place of superintendent occurring May 1, 1899, which he continued to hold until his removal to New York as before noted.

Mr. Pillsbury possesses a wide acquaintance and has attained success as a superintendent because of executive capacity and knowledge of the business, enabling him to meet and pass upon problems of management; and because of the exercise of good judgment and tact in dealing with subordinates, with whom, and by associates, he has at all times been highly esteemed. Mr. Pillsbury has traveled extensively abroad and has been a close observer of foreign telegraph methods, which he has made more or less of a study in comparison with those in this country.

J. G. Blake, Postal General Superintendent at San Francisco.

Jed Gilman Blake, assistant general superintendent at San Francisco, of the Postal Telegraph-Cable Company, has been promoted to the general superintendency, vice L. W. Storror, appointed to

JED G. BLAKE.
General Superintendent Postal Telegraph-Cable Company, San Francisco, Calif.

the newly created office of Pacific Coast Representative. Mr. Blake is a New Englander, having been born February 6, 1860, at South Royalton, Vermont. He began his telegraphic career in 1876 in the employ of the Central Vermont Railroad at Milton, Vt., in which service he remained until December, 1879, when he was appointed manager of the American Union Telegraph Company at St. Albans, Vt., subsequently filling a similar position at Burlington, that state. In January, 1881, he

became manager of the Western Union Telegraph Company at Glens Falls, N. Y., a year later accepting the managership of the Mutual Union Telegraph Company at Burlington, Vt. After two years in this position he became temporarily associated with the Vermont Central Railroad, but in September, 1883, went to Montreal to assume the place of chief operator of the Canada Mutual Telegraph Company. From October, 1886, to July 31, 1889, he filled the position of inspector of the Canadian Pacific Railroad Company's Telegraph. This he resigned to take charge of the Postal Telegraph-Cable Company at Seattle, Wash., an office he continued to hold until April 1, 1902, when he was made superintendent of the company, with headquarters at that point. His fine executive abilities soon gained him larger recognition, and on February 1, 1907, he was elevated to be assistant general superintendent at San Francisco, from which, as first stated, he has now been promoted to the general superintendency.

The Railroad.

The twenty-seventh annual convention of the Association of Railway Telegraph Superintendents, appointed to meet at Montreal, Que., on Wednesday, Thursday, Friday and Saturday, June 24, 25, 26 and 27, will undoubtedly be a meeting that will rank among the most important of the long series ever held. Among the numerous subjects that will come up for consideration, none are likely to receive more attention than the application of the telephone for train despatching purposes, now coming into such vogue. Those who intend to make exhibits of apparatus of any kind on this occasion should bear in mind that a custom house intervenes between this country and Canada. That fact need not, however, work a hardship, for the question of duties will be met and overcome if exhibitors will invoice their goods in triplicate. They will be passed and duty collected, but the amount so paid will be refunded when the goods are returned. A declaration of all such entries should be made to the United States customs authorities before leaving the country that the goods are to be returned.

General Manager R. H. L'Hommedieu, of the Michigan Central Railroad, is authority for the statement that the telephone is well adapted to the work of train despatching, and that "the results are more satisfactory than in the present method of telegraphic despatching. It is quicker, and every bit as safe. A despatcher sits with a headpiece with receiver at his ear and mouthpiece attached, and as he tells his orders over the telephone he writes them down, giving the operator at the other end, in this way, time to do the same. The operator to whom he is speaking then repeats the orders as he has them written, and if this reply is correct the despatcher gives the order his 'O.K.' and it goes on file. The operator may talk back, giving what he has received much quicker than he can by the Morse instrument, and the dictation of the order over the telephone takes no more time, if as much, as the present Morse telegraphic system.

"We are now investigating the cost of the initial installation, and I can see no reason why some of our branches should not be equipped with the telephone despatching service during the present year, and in time it will probably supersede the telegraph on the entire system." Mr. E. H. Millington is suprintendent of telegraph of the Michigan Central Railroad, and will have charge of these installations.

THE TELEPHONE ON THE ILLINOIS CENTRAL.

In reply to a letter of enquiry, Mr. G. H. Groce, superintendent of telegraph and signals of the Illinois Central Railroad Company, at Chicago, writes as follows concerning the application of the telephone in train despatching in his system:

This company has used the telephone to some extent in train despatching for several years. The application, however, was confined to lines under construction, which, after completion and turned over to this road, the telephone system would be discarded for the telegraph. The change from the telephone to telegraph was not made because any trouble was ever experienced, but simply because telegraphic practices of many years were considered standard. About four years ago the installation of a large mileage of controlled manual block, which was operated by telephone, brought us a step nearer to the use of the latter instrument for general train despatching. Early in March of this year a telephonic train despatching circuit was installed between Chicago and Kankakee, Ill., a distance of fifty-five miles, and since that time the despatching of all trains in that district has been done by telephone. The experiment has been successful and has given satisfaction to all concerned. Arrangements are being made for an extension of the practice. Ordinary commercial transmitters and receivers are used, but the arrangement in the offices is somewhat different from the usual wall or desk sets. The transmitters and receivers are so arranged that they can be handily operated, either at the despatching offices or at the offices out on the line, while the men are free to use both hands in copying train orders and doing other necessary work connected with train despatching.

The despatching circuit is necessarily of a different nature from the ordinary exchange service, as it is necessary to have a number of offices on one circuit. This made the ordinary generator or battery type of call impracticable, and it has therefore been necessary to develop some kind of a practical selective call. Up to a few months ago there was but little demand for a selector, and for this reason not very much attention had been given to the development of such an instrument. Several selectors are now on the market and the one which we have had in service on the line between Chicago and Kankakee has given entire satisfaction. Some improvements have been made in this particular type of instrument since that installation and seventy-five additional machines of the new type will be installed within a few weeks. One district will be equipped with a different type and the adoption of a standard will depend upon results obtained from the different kind of machines we test by actual operation.

From results which have been obtained by this company and two other companies with which I am acquainted, it is my opinion that the practice of despatching trains by telephone will increase rapidly.

Cable Men at a London Banquet.

Sir John Wolfe Barry, K. C. B., gave a dinner in London recently to the directors and staff of the Eastern and Associated Telegraph Companies. Besides the gentlemen thus included a number of guests well known in telegraph and cable circles were present, among whom were: Messrs. George G. Ward, Frederick Ward and Albert Beck, of the Commercial Cable Company. In the course of an address delivered on the occasion by Sir John Denison-Pender, he said:

They were face to face with another International Telegraph Conference, and he felt he must say, so far as the telegraph companies were concerned, that it was unfortunate that these meetings were held so often, and he was not sure that there was much benefit derived by the governments of the world from these Conferences. The companies had no vote, and were only able to put forward statements and to ask the governments to support them in maintaining a fair and reasonable tariff for their messages. Up to quite a few years ago Great Britain and Denmark could claim the parentage of all the companies owning the submarine cables of the world, but more recently America, France, Germany and Holland had come into the business and were competing for traffic. So far as their American friends were concerned they were in a different position from the others. They were independent of government control of their submarine service, and could also control the land lines of the country. In the early days of submarine cable enterprise fighting was considered the proper course to adopt. But it was not long before those who promoted this great enterprise arrived at the decision that friendly rivalry was to be preferred to fighting, and while the Great Northern and the Indo-European companies were among those who engaged in the contest, and fought with an energy which was to be expected from the able men who directed the fortunes of those companies, it was pleasant to know that satisfactory working arrangements were the ultimate outcome of the negotiations which ensued. Although the companies remain on competitive terms for traffic, they now all work in the most amicable way. The arrangements between the companies were in no sense against the public interest, which were well cared for by the governments of the world, apart altogether from the steps taken by the companies to safeguard them. The rates charged for submarine telegraph messages were fair and moderate, and only allowed a reasonable dividend to be paid and a proper strengthening of the reserve funds of the companies in order that existing cables may be renewed when necessary and that new cables may be laid to meet the public requirements. The strength of the British cable companies was in the fact that they had not only laid additional cables alongside the older cables, but had endeavored by alliances to form such a network that total interruption had become almost impossible. What was required now was a certain strengthening of the land line communication. This was gradually becoming accomplished by the laying of underground cables, and for this improved service the cable companies had to pay their share. He was sure the cable companies suffered more from the breakdown of the land lines than from the breakdown of their own submarine lines. He coupled with the toast the names of George G. Ward, of the Commercial Cable Company, and K. Suenson, of the Great Northern Company.

Mr. Ward thanked the company for the cordial manner in which the toast had been received. The Associated Companies always seemed to him to enjoy peace and harmony, while those who were engaged in the Atlantic service seemed always armed for war, and he usually found himself on the fighting side. This was probably due to the keen competition they had to encounter. He was very pleased to see present his great opponent and old friend, Mr. J. H. Carson. He had always thought that Mr. Carson and himself could furnish the material for an interesting book on "The Trials and Tribulations of a Competitive Cable Manager." This book should have a large circulation, for it would give hints as to how to regain and to retain a customer, and how to deal with a customer who complained that he had lost a large sum of money owing to his message arriving too quickly. In such a case as this the customer always ended by threatening to go to the "other company," and he supposed that meant that he went to the Anglo because he could there get a little slower service. He felt sure such valuable hints would be of service to their friends the Associated Companies. This was, however, hardly to the point. Speaking of the Associated Companies took him back nearly forty years, and one could not mention this great enterprise without asking who created it. It was a master mind, a man of great courage and untiring energy, of great foresight and broad views. When they considered what the late Sir John Pender did for the British empire and for the public at large he might well be termed the "Cable King." He brought the colonies within a few minutes' touch of the mother country. He commenced with the Atlantic in the early sixties, and was continuously engaged in the extension of submarine telegraphy to the day of his death. He (Mr. Ward) served under him for several years, and appreciated his work. He had often asked himself whether the services of this great man had been adequately recognized, and he felt that this had not been the case. They were all gratified to know that the management of the Associated Companies was being carried on by his son, Sir John Denison-Pender, a man devoted to his work, and with every detail at his fingers' ends. Then as to the rank and file. He did not know where they could find a more loyal and efficient staff. Before resuming his seat he would like to say a word about their chairman, Sir John

Wolfe Barry. The Associated Companies had at their head a man with such ability that they could not go wrong. His broad views and his grasp of the situation were remarkable. With such a chairman, and such a managing director, and such a staff the ship could never sink. It afforded him great pleasure to respond to the toast.

Radio-Telegraphy.

The submarine cable between Nantucket and Martha's Vineyard, which has been broken for sometime past, was repaired recently by the cable steamer Western Union, thus restoring land line connections of the Nantucket wireless telegraph station.

A patent, No. 887,598, for an electrical condenser suitable for use in wireless telegraphy and other purposes, has been granted to Lucien Henri Delloye, of Paris, France. An electrical condenser comprising a pair of wire nettings imbedded in a block of glass.

A patent, No. 886,983, for a coherer and decoherer, has been awarded to Joseph L. Jones, of Kizer, Tenn. The patent covers a decoherer electromagnet, an armature arranged within the field of force of the magnet and having a hooked end, a make-and-break device and a coherer supported by the hook.

The United State Signal Corps conducted recently some experiments with wireless telegraphy from a balloon. A receiving wire was hung from the basket, which latter was covered with wire netting. With the balloon over Washington, wireless messages from Annapolis were clearly received. Major Edgar Russel, who had charge of the experiment, said that wireless telegraphy from balloons will prove most useful in warfare, as a balloon could float over a battle-ground and give the commanding officer exact details of every move made by the enemy.

The English Post Office Circular contains a notice to the telegraph department that telegrams intended for transmission to Montreal by the Marconi Company's wireless service (via Clifden) can only be accepted at post offices as inland telegrams, addressed to "C/o Expanse, Galway." If replies to inward telegrams received by the company's service are prepaid, the prepayment covers, so far as the Post Office Department is concerned, the inland transmission only, and the reply must be addressed, like other outward telegrams.

The guests of the Plaza Hotel, New York's newest and largest hostelry, will shortly be able to communicate with friends on transatlantic steamers without leaving their apartments. The work of installing a wireless station on the hotel roof, three hundred and nineteen feet above the street level, has been begun, and the three steel flagstaffs already on the roof reduces to a minimum the expense of constructing the station. The De Forest system will be used, and the management of the hotel will own the station, which it will build and operate. An operator will be at the station every day, and arrangements will be made for telephone communication between the operator and every room in the hotel.

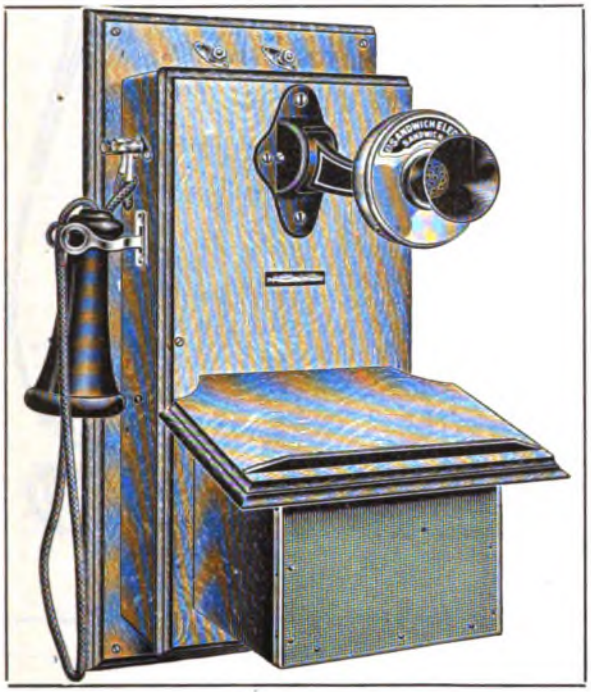
The "Edinburgh Review," for April, according to an English exchange, contains an instructive article with the title herewith given in which the author reviews at some length what may be termed the radio-telegraph position, the object being to place readers of the "Edinburgh" in possession of the main facts concerning the history of what may be termed the new science and practice of communication by means of electromagnetic waves. The value of the investigations of several of the principal workers in radio-telegraphy is duly credited, including that due to Sir Oliver Lodge for his famous lecture introducing the subject at the Royal Institution in 1894. The bearing of recent legislation upon the practice and industry of wireless telegraphy is well shown as is also the necessity for legislation in order that radio telegraphic working may be under effective control. How necessary such legislation had become and how desirable it was that the state should step in and organize the business of radio-telegraphy is also well shown by the writer, who has a clear grasp of his subject and writes in a manner both instructive and interesting to the lay reader. It is, of course, in the field of ship and shore work that the greatest advance in radio-telegraphic operations has been made, and the writer of "The Politics of Radio-Telegraphy" has a great deal to tell us of the political aspects of the question. The interest taken by the German Emperor in this subject from the earliest date, resulting in his invitation to the powers for a conference in Berlin, as far back as 1903, is noted.

A New Canadian Telegraph Company.

A new telegraph company, which proposes to extend its lines from coast to coast, and to cover thoroughly the settled parts of Canada, is in process of formation in Montreal. It is known as the "Northern Commercial Telegraph Company," and will, it is said, be capitalized at a large amount, though those who are organizing the concern will not give the exact figures just yet. The Montreal address is at the Pelican building, that city.

Mr. Charles O. Butler, of Greensburg, Pa., at one time a member of the telegraph profession, now engaged in other business, writes to this journal that he owes his success in life to the fact that he profited by the teachings of Telegraph Age, and that his telegraphic education, in which he carefully pursued in consequence, proved a stepping stone that lifted him into a wider sphere of endeavor.

Railway Composite Apparatus



STATION TELEGRAPHONE NO. 7.
Patent Nos. 831,525
839,210
882,347

Under ordinary conditions this instrument will operate a distance of 100 miles on an iron Morse wire, and twice that distance on copper, and any reasonable number of instruments can be operated on one circuit.

Made in the following types:

Station, Caboose, Portable, Siding, Iron-box : : : :

Kindly furnish us with a diagram of the line upon which you wish such service and we will be pleased to give you the desired information.

SEND FOR OUR LATEST CATALOGUE

THE most commercially satisfactory composite telephone ever devised. All instruments equipped with the howler call and absolutely non-interfering with the Morse circuit.

Four cells of No.6 dry battery is all that is necessary for both talking and signaling, and renewals required only three or four times per year.

All caboose and portable sets equipped with jointed pole and one hundred feet of flexible cord for making connection with the line wire.

We have hundreds of these instruments on many of the largest railroads of this country and Mexico and perfect satisfaction is being obtained.

SELECTIVE CALL

Our selective calling device for telegraph offices is an entirely new innovation, operating on a reversed current; it is not continually in motion and can be operated only by the dispatcher.

Can be used on both single or metallic circuits.

Will work on the same Morse way wire with no action of mechanical parts excepting when call is being made selectively.

Has been in operation for some time on one of the largest roads in the country and without a failure.

Calls can be made individually, consecutively or in groups.

SANDWICH ELECTRIC COMPANY

SANDWICH, ILL

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NEW YORK, JUNE 1, 1908.

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.

A System of Telegraph Pension.

A telegraph official recently in discussing the subject of the personnel of the profession to which he belongs, of the need that exists of stimulating within its ranks greater effort on the part of the individual in order to attain a higher measure of success in life than usually attends the career of a telegraph operator, advocated the adoption of a system of pension, the benefits of which to be applicable only to those persons in and above the grade of superintendent. It would be out of the question, of course, for a telegraph company to inaugurate a regular pension system covering the rank and file of its service, the multitudinous number of employes prohibits such a thought even. Moreover, were such a general proposition possible, it is doubtful, from a moral point of view, whether its adoption would be expedient, for it may well be questioned whether such a practice would act as an encouragement of diligence, of thrift and of prudence. Nevertheless, it is the exceptions that prove the rule, and accepting human nature as we find it, if a reward for merit were held out to those who should work their way upward in the service to as high a point as that of superintendent, the official who was discussing the subject said he believed that practical benefits alike to the individual and to employing interests, would be the result.

At best the telegraph service can hardly be regarded other than as furnishing a training school, excellent in its teaching, to willing minds, especially valuable for the drill it affords, the widening of acquaintance and the opportunities it offers as a means to an end—a stepping-stone to other and better paying avocations in allied forms of industry. Such a view of telegraph employment serves, and very properly so, to recommend it to the young. So regarded by the conscientious toiler a stimulous to careful work is found because of the resultant outgrowth of good that is expected to follow. If, however, men who love the profession, who desire to remain in it, and who are fired with a determined ambition to reach the top, could be assured that after attaining high office, won by merit, due to intelligence and careful preparation, that they would be provided for in their old age or in case of disability, it was thought that a reserve class of men would be developed in the telegraph whose fitness for responsible place would meet the necessities of demand. The crowning argument by the official who brought up this subject was that the need of competent men to occupy the higher executive positions in the telegraph service is clear. As time passes, this requirement, he said, will become more and more pressing. Training alone can produce a desirable official, and to such a financial guarantee, which shall sustain them through the last years of life, should not be withheld.

Place the Responsibility Where It Belongs.

The aspersions that the organized telegraphers cast upon telegraph management and service in their manifest desire to cause embarrassment to the two telegraph companies, is retroactive in its signification, for it reflects in strong measure upon the undesirability and in general the inefficiency of those who are responsible for their utterance. Bitterness due to failure has made them illogical in statement, for when the users of the telegraph are informed, for instance, that the telegraph operators of to-day are inefficient, the complaints, unconsciously, perhaps, give voice to a truism, the full force of which falls upon themselves. If it be true that inefficiency exists among the telegraphic operating forces, it cannot be the result alone of late years. Its origin must be traced backward through a long period, a period during which the organized telegraphers, who are

now on the outside in the attitude of throwing defamation at the business that once sheltered and protected them, were receiving the pay that is earned by and accompanies employment. What then does the assertion of inefficiency mean? No other understanding can be arrived at than that the individual telegrapher himself has retrograded. The wires in use are just as good, or even better, than they ever were. The instruments on the operating room tables are more perfect. The typewriter, which makes good copy, is in universal use. Then to what is the alleged inefficiency due? The answer is a sweeping defamation of those who have taken it upon themselves to pass strictures upon the telegraph. It is, as we have frequently pointed out, because of the growing disposition in late years of the average operator to be slack in the performance of his duty; he has been lacking in enthusiasm, in the desire to "want to know," as Dr. Rheem so expressively stated it.

The spirit of unionism is responsible for much of the evil influence that has seized upon the operator. The tendency of the union is to degrade and not to elevate, and to its cruel iron hand of authority the hardships of many operators are directly traceable. The union looses sight of the fact that an incompetent operator cannot be too poorly paid. As a matter of fact he ought to be denied employment altogether. Yet the union would place the incompetent and the competent upon the same level, demanding the same pay for both. In the divine order of things extra talents were given to some and withheld from others. It is man that would force an unnatural evenness in the economy of the world, not God.

The union has spent a great deal of time and money with legislatures, both state and national, in its foolish endeavor, born of estrangement, to secure the enactment of some sort of legislation that will hit hard at the telegraph companies. The position taken is such a mistaken one, is so illogical that instead of arousing sympathy, as was hoped, the country at large and its vast interests of business, are growing weary and disgusted with the everlasting airing of grievances that do not exist in fact.

There is room for improvement in the operating departments of the telegraph, but it will not be brought about by the utterances of extravagant statements. It can only come when individual operators determine to deal honestly with themselves and with the company that employs them, by giving the best service that within them lies. Every young man should not lose sight of the fact that he has a future before him, a future with the success or failure of which he himself is the largest determining factor.

The Supreme Court of the state of New York, Justice McCall, handed down a decision, on May 22, denying the application of Attorney-General Jackson to begin suits to annul the charters of the Western Union Telegraph Company and the Postal Telegraph-Cable Company. The action was brought by the Attorney-General after the strike of the telegraph operators, on the ground that the telegraph companies were a monopoly in restraint of trade. In his decision the justice said: "A careful examination of the papers submitted herein satisfies me that there is no merit in fact or warrant in law for the permission sought, and the motion is therefore denied."

A recent decision in a so-called mental anguish case, in Texas, carried with it a fine of $500, imposed against a telegraph company because its operator accepted and transmitted a telegram written in Spanish, a language with which he was not *au fait* and so failed to grasp the meaning, and inferentially, the importance of the message. The judge, in delivering his opinion, advanced the hypothesis that operators should possess linguistic abilities, for he said that "telegraph companies should hold themselves as being ready and competent to send messages to all parts of the world in different languages, and to hold that it is a defense to an action of negligence to prove that the agent of a telegraph company did not understand the language in which the message was couched would place it in the power of such company to almost paralyze the commerce of the world by its negligence."

The commonwealth of Texas is responsible for much that is calculated legally to cause not only embarrassment but mental anguish galore to telegraph interests, for the telegraph companies are compelled to defend, it is said, three thousand suits every year in that state alone.

No Strike, Say Chicago Postal Men.

The Daily News, of Chicago, published on May 22 the following letter received from a number of operators of the Postal Telegraph-Cable Company in that city:

> We notice in your issue of yesterday an article given considerable prominence headed "Wire Men Talk Strike," etc., and, as it refers to the telegraph operators in the employ of the Postal Telegraph-Cable Company, we shall be pleased to have you give equal prominence to our statement that Wesley Russell does not represent our sentiments and has no authority to speak for us and that the matter of a walk-out or strike of the telegraph operators will be given no consideration whatsoever. In this we are voicing the unanimous sentiment of the operators employed by our company in the Chicago office.
>
> Ida Naggatz — John Ebbs
> J. J. Brosnan — E. W. Blakeley
> Carl Otto — R. A. Ditch
> H. T. Cook — F. J. Wilbee
> W. G. Washburn — Emma Hauner
> C. A. Dortmund

Telegraph Age has received many similar letters from operators in various parts of the country, repudiating the "strike talk," so called, that appears every little while in the public press, but they were sent us in confidence and not for publication. We desire to congratulate the em-

ployes of the Postal company in Chicago for the public stand they have taken against the insinuation of disloyalty. We believe that the breach between the officers of the telegraph companies and those employes who took part in the late unpleasantness, is gradually disappearing, and we trust that the malice of the few agitators will in no wise interfere in the promotion of harmony which is essential alike to the success of employer and employe.

The International Telegraph Conference.

The International Telegraph Conference which began its sessions at Lisbon, Portugal, on May 4, is being held in the Palacio Palmella. The delegates were welcomed by an address from the Minister of Public Works, Senhor Carnet de Magalhaes, after which the Conference was presided over by the principal Portuguese delegate, Councillor Alfredo Pereira, Director-General of Posts and Telegraphs and Vice-President of the Portuguese Chamber of Deputies. The vice-presidents selected were: Councillor P. B. Cabral, of Portugal; M. Peter de Szalay, of Hungary, and Colonel E. Frey, director of the International Bureau, Berne, Switzerland. It is believed that the meeting will last from five to six weeks. After the inaugural proceedings the delegates elected four committees to deal with (1) rules and regulations, chairman, Mr. H. Babington Smith, of England; (2) rates, chairman, M. Bordelongue, of France; (3) telephones, chairman, M. Pop, of Holland; (4) drafting, chairman, M. Banneux, of Belgium. A special committe has also been appointed to consider a number of propositions relating to the revision of the St. Petersburg convention of 1875, under which all matters relating to international telegraphy are regulated. On the evening of May 4 a banquet was give in honor of the delegates, the guests numbering nearly one hundred and fifty. On May 6 the delegates were present at the interesting ceremony of oath-taking by the new King of Portugal.

Hon. Charles Page Bryan, the American Minister to Portugal, gave a reception, on May 17, to the delegates to the Conference. It was a brilliant affair.

It is stated that China will present a statement at the Conference as to the infringement of her sovereign rights regarding telegraphs in Manchuria. The matter, however, is not likely to receive a favorable hearing, as China's internal telegraphs are the worst in the world, being under divided control and without proper organization, while the charges are exorbitant.

Mr. Roland R. Dennis, the representative of the Department of Commerce and Labor of the United States, who has been attending the Conference, left Lisbon, May 23.

The First Telegraph Wire Operated in America.

In one of the locked alcoves of the library of Princeton University is a manuscript volume of some seventy-six pages written by Professor Joseph Henry, the famous electrical scientist, giving an account of his researches while a professor at Princeton in the chair of natural philosophy or physics. In 1848 he went to Washington to organize the Smithsonian Institution, of which he had been appointed the first secretary. In 1876, two years before his death, he was asked to write an account of his work at Princeton. This document is now in the university library.

It was across the Princeton campus that Henry strung what is said to have been the first telegraph wire ever operated in America. A year or two before he left Albany, N. Y., he had been working at his invention of the electromagnet for transmitting signals at a distance whereby dots might be made on paper and bells struck, indicating letters of the alphabet. He refused to patent this invention on the ground that it was incompatible with the dignity of science to confine the probable benefits to the use of any one individual.

In his statement he says: "I think the first actual line of telegraph using the earth as a conductor was made in the beginning of 1836. A wire was extended across the front campus from the upper story of the college library building to the philosophical hall on the other. Through this wire signals were sent from time to time from my house to my laboratory."

The operator at the other end of the line was usually Henry's wife, and the exchange of communications between the two seemed to undergraduates of those days little short of miraculous.

Portions of Professor Henry's electrical apparatus are still in the university museum, among them being his giant electromagnet nicknamed "Big Ben," by the students, for whom he constructed it. By electrical communication controlled from his house across the campus this magnet lifted or released a weight of 3,000 pounds in his laboratory.

James Wilson, superintendent of the Canadian Pacific Railway Company's Telegraph, at Vancouver, B. C., in renewing his subscription recently, took occasion to write:

"I am very much pleased with the general improvement shown in the respective issues of Telegraph Age, and would be very sorry to be without it. Should my subscription ever run behind, please do not discontinue sending the paper along. We sometimes forget the newspaper man for a time, but we do not forget to read the news contained in each number, and to act on the good advice given in the editorial columns."

Train the eye, the ear, the hands, the mind—all the faculties—in the faithful doing of your work.

The Typewriter and Piece-Work in Telegraphy.

BY DONALD MURRAY, M.A., OF LONDON.

If some magic carpet suddenly transported a British telegraph engineer into a large New York telegraph office he would at first be dazed by the extraordinary clatter of the sounders, which are tuned up to make about four times as much noise as the British variety. The next sound to catch his attention would be the click of typewriters. He would see typewriters by dozens and scores, every operator with a typewriter, and all telegrams being typewritten. The pen used to be mightier than the sword, but there are no swords and very few pens in American telegraph offices nowadays. Every operator has his "mill," as the typewriter is familiarly called. The telegraph companies do not supply the typewriters. Each man has to furnish his own machine, and a telegraph operator without a "mill" has now no chance of employment in any of the large cities of America. The typewriter manufacturing companies make special efforts to cater for the custom of operators, and dealers in second-hand machines do an immense business among the telegraph fraternity. When an American operator is out of work and hard up he sells his typewriter to one of these agencies, or if he gets a job he hires a "mill" until such time as he is in a position to buy it.

The use of the typewriter as an ally of the Morse key and sounder is a very old story in the United States, but it was not till about 1890 that it began to come into general use, and now an operator in America is as helpless without his "mill" as a cowboy without his gun.

So far as the telegraph companies are concerned the direct pecuniary saving through the employment of the typewriter has been small, but the companies have derived various indirect benefits. The public have gained by getting clear typewritten telegrams, and the competition between the two great telegraph companies has made the use of the typewriter absolutely unavoidable. The typewriter also has resulted in considerable speeding up of telegraph work. The great gainers from the use of the typewriter, however, have been the operators themselves, and it is no doubt for that reason that the cost of providing typewriters has fallen on the operators. The increase of output by the use of a typewriter compared with a pen is nothing like so great as is generally supposed, and the real advantage of the typewriter does not lie so much in increased output as in rescue from pen slavery. The nervous strain and muscular drudgery of rapid writing is enormous compared with the same work done on a typewriter. When using the pen or pencil one group of muscles and one set of nerves have to perform a very complicated series of motions for each letter. With the typewriter, on the other hand, one simple motion of one finger is sufficient, and even this great reduction of muscular and nervous strain is again reduced eightfold by spreading the work over all the eight fingers of both hands. It is this complete release from pen servitude that has made the typewriter such a boon to telegraph operators in America, and it is surprising that telegraph operators in this country have not long ago recognized the "mill" as a friend and helper.

Roughly speaking, in America the effect of the typewriter has been to lighten the work of the receiving operator and to increase his efficiency. Operators who ranked only as second class on account of slowness or defects of penmanship have become first class. Formerly the sending operator on the Morse key could make the receiving operator "sit up." With the advent of the typewriter, however, the position is now reversed, and the receiver can take with ease all that the finest star operator can send. In America this has led to the extensive use of word contractions, and these have been standardized and published in a manual known as "Phillips Code." All good American operators use this code, and, although the sending operator can no longer make the receiving operator "sit up," the former can at least keep the latter busy even on the typewriter. Of course, contractions are employed by telegraph operators all over the world, but not to anything like the same extent as in America. Here, for instance, is an example of the way in which press messages are sent on the Morse key in the United States:

Mems o cx Cgs rptg und cv cmns o eno cap wo krp xgn ifo thr adhts wi cmb aga ay emt to t crpns, bt cujx es dtmd efo qpt peo f sq stas wi efy dmz ay osn.	Members of Congress representing under cover combinations of enormous capital who corrupt legislation in favor of their adherents will combine against any embarrassment to the corporations, but courageous and determined effort on the part of the people of the separate states will effectually demoralize any opposition.

In the first column is given the coded message, and in the second column the translation as it is typewritten by the receiving operator direct from the sounder. Of course, operators have to brush away the cobwebs from their intellects to do work of this kind, but they are very well paid for it. An American operator, writing on this subject, says: "With an intelligent sender matter of this sort can be transmitted at the rate of fifty-five words per minute with but very little effort, and, at the same time, with reduction of the strain on the receiver to a minimum."

As regards press messages, the effect of this combination of "code" sending and typewriter receiving has been remarkable. It is now not a rare thing for two first-class press operators in America, one sending "code" and one receiving on the typewriter, to handle 20,000 words of press in one night. The record is said to have been 24,000 words transmitted and received by two men in eight hours. That is roughly about twelve columns of the London Times, an aston-

ishing feat of endurance to anyone practically acquainted with such work.

The code contractions for common phrases are works of art. Here are a few examples:

Fayib—Filed a petition in bankruptcy.
Dbf—Destroyed by fire.
Cats—Created a tremendous sensation.
Ckx—Committed suicide.
Asaph—A speculative demand with prices higher.
Bsql—Business small and quotations lower.
Herdam—Heavy receipts depress the market.
Utc—Under the circumstances.

I do not know what the rule is now, but a few years ago the telegraph companies encouraged the use of code for press work, and strictly forbade its use in handling commercial messages. As both the Western Union and the Postal telegraph companies have a large number of "bonus" circuits on which the operators are paid a halfpenny per message for all that they send over about 300 per day, and some of the records made with the Morse key, code, sounder and "mill" are surprising, especially when it is borne in mind that in American messages only the text is paid for, the address going free, and that, therefore, American messages average about thirty words compared with the British twenty; also that about half of American messages are code messages in the ordinary sense, and that, therefore, the Phillips contractions are not applicable to them. Under these circumstances a speed of forty messages an hour is quite ordinary, a speed of sixty messages an hour is regarded as very good, and eighty messages an hour have been transmitted for hours at a time.

In Canada and other new countries the typewriter is also being quite freely used in telegraphy. On the Continent of Europe there is but little scope for it, as the bulk of the traffic is handled by the Hughes, but in Russia the large telegraph offices employ dozens of typewriter girls to type up messages from the received Wheatstone slip, the Wheatstone being extensively used in Russia, owing to the immense distances covered by the telegraph network.

In conclusion, a paragraph in regard to the bonus system and typewriters from a letter written by Mr. Minor M. Davis, electrical engineer of the Postal Telegraph-Cable Company in New York, may be of interest. It is as follows:

"Replying to your questions about the bonus, or piece-work, system: A minimum, intended to represent a good day's work, is determined upon by observation. The typewriter enables a capable receiver to comfortably transcribe 'anything that comes clear,' and the stress of fast work has been shifted to the sender by that machine. Observation, checked by experience, shows that between 8 a. m. and 5.30 p. m. a good man will handle about three hundred messages on a New York-Boston circuit, three hundred and twenty-five on a New York-Philadelphia circuit, two hundred and eighty on a New York-Chicago, and so on, the allowances being made for more interruptions to the longer circuits. There is no science in the proportions; as stated the minimum is arbitrarily determined after observation. With these figures to be reached between 8 and 5.30, each operator on these piece-work circuits is allowed one cent per message for each message handled in excess of the minimum; or, if he prefers to cease work when he reaches the minimum he is excused and paid his regular salary for the full day. There are comparatively few circuits that can be operated in this manner (we have only about twenty-five of them). The increase in speed is considerable. It is not uncommon for an operator to handle a hundred messages more than the minimum, and sometimes operators handle five hundred messages in a day. I have known one or two cases where six hundred have been handled. Operators are not required to work at these very high speeds; but usually they are applicants for these circuits. It takes 'good men' to work them, and operators like to be known as capable of the work. They are required to do good, clear, accurate work, and they are held to the usual accountability for errors. Abbreviating the text (coding) is prohibited. The bonus system, like every other, fails to manage itself. There is temptation to do this, that, and the other thing that cannot be permitted; but, instead of sitting at a 'busted' wire perfectly content to do nothing, the bonus operator co-operates with the chief in making stops as few and short as possible. With proper supervision, and provided that the operator gets regular pay (minimum) that insures to him a fair income, I believe the system to be a good one for both employe and employer. Tendencies to kill the goose by overworking should be discouraged. This company certainly does not ask or wish its employes to overwork. There was no special trouble in introducing the typewriter. It makes the receiver's work easier. It brings in a few errors of its own, but, on the whole, is beneficial to the service. It has probably added something to the speed—no one knows how much; but, in message work, the chief gain is probably due to the fact that operators who are not expert with the pen can readily 'keep up' when they use a machine."—The Post Office Electrical Engineers' Journal, London.

At present there are three organizations in Japan which are directly connected with the electrical science. These are the Telegraphic Science Association, Electrical Association and Electrical Science Association. Mr. S. Kanda, a member of the former, and an authority on the telegraph, read recently an original paper at one of its meetings entitled "The Sag of a Wire Suspended at Two Points of Support at Different Levels."

The Electron Theory.

BY EDWARD J. PARTRIDGE.
(In the Journal of the Franklin Institute.)

The object of this paper is to set forth the electron theory and to describe briefly its experimental foundations. The theory came into being when it was established that negative electricity is atomic in character; that a negative charge is always a whole number multiple of a definite indivisible quantity of negative electricity. The atom of negative electricity has been named an electron. The first hint that electricity is discontinuous was given by Faraday's work on electrolysis.

To show that in electrolysis equal quantities of electricity are always associated with equal numbers of atoms a monovalent element and that the ratio between the quantity of electricity passed through a solution and the number of atoms set free is twice as great for a divalent element as for a monovalent element, is to indicate that matter and electricity are similar in constitution.

But Faraday's laws of electrolysis remained for more than fifty years the only statement of fact best explained on the hypothesis of atomic electricity.

Maxwell's far-reaching theory of electricity and its immediate consequence, the electromagnetic theory of light, seemed to fasten attention upon differential equations and to cause men to be satisfied with a mathematical statement of the propagation of a disturbance and not to inquire concerning the nature of electricity. Then, too, the experimental verification by Hertz of Maxwell's theory emphasized its importance. But how unsatisfactory the theory of electricity seemed to students fifteen years ago. There was little connection between electrostatics and electrolysis, or between electrodynamics and the theory of thermocurrents, and the phenomena of vacuum tubes were but little understood.

It is in this last field that the greatest harvest of truth has been reaped. Sir William Crookes, in 1879, read a paper entitled "Radiant Matter." In that paper he described many of the phenomena caused by what we now call kathode rays. He maintained that the effects he described were due to streams of negatively electrified particles of matter that were shot off from the kathode and by their mechanical energy produced the observed effects. Crookes' view was opposed by the Continental physicists and defended by the English, with the result that the phenomena have been most thoroughly investigated in a long series of brilliant experiments. One of the side results of the work with vacuum tubes was the discovery of Röntgen rays. Finally it has been established that the properties of the kathode rays are independent of the nature of the residual gas in the tube. A kathode ray particle possesses the same mass and the same charge of negative electricity if produced in hydrogen or oxygen, carbon dioxide or helium.

The determination of the velocity and $\frac{e}{m}$; that is, the ratio of charge to mass has been accomplished by extremely ingenious experiments. One method of measuring the velocity and $\frac{e}{m}$ is to determine in the same kathode ray tube, the charge carried in a given time by the kathode rays, the heat developed by their impact, and the deflection of the stream by a magnetic field of known strength. The first of these quantities depends upon the number of particles and the charge on each; the second on the number and the mass and velocity of each; the third on the ratio of charge to mass and the velocity of each. From the equations expressing the actual relations the number of particles can be elimiated and the velocity and $\frac{e}{m}$ found. The velocity under ordinary conditions turns out to be of the order of one-tenth the velocity of light. The ratio of $\frac{e}{m}$ is about one thousand times the corresponding ratio for the hydrogen atom in electrolysis. J. J. Thomson, to whom much of this work is due, named the kathode ray particle, a corpuscle. In the interpretation of this ratio we are confronted by two possibilities, either the corpuscle is an atom of hydrogen with a charge one thousand times greater than the charge carried by the same atom in electrolysis or we are dealing with masses smaller than the hydrogen atom.

The study of radiation, and in particular of the spectra of the elements has for many years rendered familiar the notion that an atom is not an absolute unit, but is a complex, whose parts are capable of vibration within the atom. Iron, for instance, yields a spectrum consisting of hundreds of lines, every one of which corresponds to a vibration within the system that we call an atom. The electromagnetic theory of light teaches us that it is electricity that vibrates in an atom. To account for the series of doublets and triplets in many spectra, Stoney considered the atom as something like a diminutive solar system with the places of the sun and planets taken by minute electric charges. He called these charges electrons. From a consideration of the mutual perturbations of their arbital motions he formed a rational explanation of the existence of the doublets and triplets in spectra.

If the light emitted by a body is due to electrical oscillations within the atom, a magnetic field will modify the period of oscillation. Zeeman, in 1897, discovered this effect. A special line is split into two if the light-giving source is placed in a powerful magnetic field and observed along the lines of force; into three, if observed at right angles to the magnetic field. The amount of the separation produced by a field of known strength permits the

ratio of charge to mass of the vibrating electron to be calculated. It turns out to be the same as $\frac{e}{m}$ for the kathode rays. When a single spectral line is split into two by looking along the lines of force each component of the magnetically produced doublet is circularly polarized, the circular polarization being in opposite directions. The triplet observed on looking at right angles to the lines of force is characterized by the two lateral components showing plane polarization in planes at right angles to each other, while the central component is unaffected. These polarization effects demonstrate that the lines in a spectrum are produced by vibration of negative electricity.

This is the description of the Zeeman effect in the simplest form as it had been foreseen by Larmor and Lorentz long before it was observed. In addition to this simple phenomenon many lines show a much more complicated behavior, resolving into numerous components when the source is in a powerful field. The vibration frequencies corresponding to lines in spectra have been shown to be related by a comparatively simple law and have been arranged in series. The Zeeman phenomenon is the same for all the lines belonging to the same series and for the corresponding series in related elements. In a recent paper Jean Bacquerel has shown that the absorption bands in the spectra is xenotim and tysonite are affected in a manner strictly analogous to the splitting up of the lines in emission spectra. Xenotim, a phosphorous compound of yttrium and erbium, and tysonite a flourine compound of cerium, lanthanum and didymium were selected for examination because they possess particularly narrow absorption bands. At the temperature of liquid air the bands become much sharper.

The ratio $\frac{e}{m}$ having been determined by several methods, suggests the measurement of the quantities "e" and "m" separately. Here we encounter some most interesting work.

Röntgen says, radium rays and ultra-violet light ionize air or other gases through which they pass; that is to say, they render the air conducting by forming ions. By measuring the maximum current that a given volume of the gas can carry, the quantity of electricity existing on the charged ions is found. If air saturated with water vapor is suddenly expanded it will be cooled and become supersaturated in the absence of condensation nuclei. Dust particles or gaseous ions serve equally well for condensation nuclei. If saturated air freed from dust by filtration is ionized and expanded the right amount, condensation in minute drops will take place about the negative ions only.

The size of a drop can be calculated from its rate of fall, the total amount of water condensed from the cooling by expansion. So the number of drops, hence the number of condensation nuclei follows as the quotient of the total volume of water condensed divided by the volume of a drop. Knowing the number of nuclei and the amount of electricity existing as charge on ions we have the charge on one ion. The result of the calculation is that the charge on a gaseous ion is the same as on a hydrogen atom in electrolysis. This charge is the same no matter what the gas or the ionizing agency.

The final conclusion is that the "m" in the ratio $\frac{e}{m}$ is 1/1000 of the mass of the hydrogen atom.

Hertz found that ultra violet light enabled an electric spark to jump, under conditions that otherwise would permit no spark to pass. Long study has shown that a negatively electrified metal sphere will lose the charge when illuminated by ultra-violet light. A positive charge is not affected. Investigation of this phenomenon has developed the fact that the illuminated body emits electrons and that these electrons ionize the air in the vicinity, thereby rendering it conducting. Lenard studied the magnetic deflection of a stream of photo-electrons and measured the ratio $\frac{e}{m}$. Again we find the same value. J. J. Thomson by another method also obtained practically the same result.

In a recent paper Erich Ladenburg has described experiments that demonstrate that the velocity of the projected photo-electrons depends upon the wave length of the ultra-violet light that cause the phenomenon. The velocity increases with the increase of the frequency of the light vibration. This fact adds weight to the hypothesis that the electrons are torn from atoms by electric oscillations that have periods approximately equal to the natural periods of the electrons themselves. The conclusion is plain when we remember that the greater the force retaining an electron in place the shorter would be its natural period, that is, the greater its speed of oscillation and the greater velocity would it have when separated from the atom. In other words, we are dealing with a resonance phenomenon. This view is corroborated in a remarkable manner by a consideration of the optical properties of bodies as worked out by Drude in one of his last works.

Drude was ever on the alert to seize upon any method that promised to yield a clue to the constitution of matter or to reveal a connection between chemical constitution and physical properties. In 1904, Schuster published a paper in which he gave a value for the number of free electrons in metals. Drude immediately took up the idea and greatly developed it, although his results do not agree with Schuster's. The attack proceeds from the theory of dispersion based upon the electromagnetic theory of light as worked out by Helmholtz, Drude, Planck, and Lorentz. For many transparent substances the index of refraction for a wave of given frequency is shown to depend

upon the frequencies of the natural vibration proper to the substances. These natural frequencies in the cases of substances having so-called normal dispersion lie far in the ultro-violet or infra-red. The formulae yield the values $\frac{e}{m}$ for the vibrating matter and also the number of comparatively loosely bound electrons in the molecule.

The value of $\frac{e}{m}$ for the particles having the ultra-violet natural frequency is the same as the same ratio for the kathode rays. The value for the mass vibrating naturally at the infra-red rate shows that this mass is either a molecule or part of a molecule. In the cases of bodies that show anomalous dispersion the absorption bands are caused by the natural vibration of electrons, not of molecular masses. The importance and certainty of the method is shown by the fact that $\frac{m}{e}$ calculated from the dispersion of hydrogen is 1.5×10^7, while the rate for kathode rays, as determined by Kaufmann, Simon, and Seitz, is 1.86×18^7.

The values of the number of freely movable electrons in a metal as calculated from the optical properties vary from .5 to 7.5 per atom of metal. These numbers agree in general with values to be expected from a consideration of the thermo-electric electro-motive forces. The number of conduction electrons, as Drude calls them, in bismuth is particularly small, in antimony particularly great, agreeing with the well-known large thermo-electric electromotive force of a bismuth-antimony couple. Hagan and Rubens have measured the emissivities of a number of metals for very long wave lengths. These numbers permit a calculation of the number of free electrons per cubic centimeter; the results obtained agree well with those derived from a consideration of the optical properties of the metal.

Siertsema has calculated the ratio $\frac{e}{m}$ from the dispersion of the magnetic rotation of the plane of polarized light and obtained a value agreeing well with that reached by other methods.

The electron theory has been applied to explain the electrical properties of metals. This application has been made principally by Drude and Riecke In solid metals some of the electrons are free and move in the intermolecular spaces according to the laws that govern the motion of the molecules of gases in an enclosed space, and move with an average velocity corresponding to their mass and temperature, i. e., they participate in the motion that is the heat in the body. According to the theory as developed by Drude in its simplest form, the conduction of heat takes place by means of electrons, the molecules being constrained to vibrate about a mean position of equilibrium without collision, while the electrons have the progressive motion ascribed to molecules in the kinetic theory of gases. Electric conduction takes place in consequence of the forward motion between collisions, the forward motion being produced by a constantly acting electric force or difference of potential. The ratio between the conductivities for heat and electricity turns out to be a constant for all metals and proportional to the absolute temperature. But there are exceptions to this law of Wiedemann and Franz. These exceptions, together with the Volta contact difference of potential and thermo-electric electromotive forces compel us to assume that the number of free electrons is dependent upon temperature, and further that the positively charged residues take some part in the conduction of heat and electricity. The greater the deviation from the law of Wiedemann and Franz the greater is the part played by the positively charged atomic residues.

Since the electrons are considered as behaving like the molecules of a gas there will be a definite electronic pressure at a given temperature. Consider a piece of metal whose ends are at different temperatures. The electronic pressure must be the same throughout, therefore the density of the electrons must be less at the place of higher temperature, and we will have a difference of potential between the ends of a piece of metal. The work done by or against the electromotive force and the consequent development of absorption of heat make up the Thomson effect. Contact difference of potential is due to the establishment of equilibrium between different metals that have different numbers of electrons per cubic centimeter.

The electromotive force of a thermo-couple is made up of the electromotive force mentioned in the description of the cause of the Thomson effect and also of the contact electromotive forces of the two metals at the different temperatures. An analysis of the question shows that if the number of electrons in the two metals is independent of the temperature, the thermoelectric electromotive force is proportional to the difference in the temperature between the junctions.

(To be continued.)

The Korean Telegraph.

The telegraph business of Korea, as reported by Consul-General Thomas Sammons, of Seoul, is increasing, although the number of telegrams sent abroad, not including those to Manchuria, shows a decrease following the abnormal activity during the period immediately after the war. The telegraph lines aggregate 6,772 miles. American telegraph instruments are not generally used.

Memphis as a Telegraph Center.

BY J. B. DILLON.
(Chief Operator, Western Union Telegraph Company, Memphis.)

As a telegraph center the city of Memphis, Tenn., has attained a position of much importance. During the last decade, especially, the city has grown rapidly in population, and its business development has expanded in corresponding manner. Increased demands upon the telegraph service have naturally followed such progress, and the amount of traffic handled in consequence has reached very large proportions. Outward physical proof of this is shown in the fine edifices that house telegraph interests, the large operating forces employed and in the very general excellence and extent of modern equipment that has been installed in order to meet the requirements of the situation.

The statement of a few specific facts relative to the standing of the city as a center of business activity will be interesting and instructive regarded in its bearings on the telegraph. In the first place it may be remarked, that Memphis has advanced to the enviable distinction of being the largest inland cotton market in the world. Not only this, but it ranks as the largest hardwood, and the second largest lumber market in the world. Its manufacturing interests are varied and extensive, and the city is closely bound to the rest of the country by eleven trunk lines of railroad which converge at this point. The volume of business transacted at Memphis for the fiscal year 1906-07, amounted to $425,000,000, while the bank clearings totalled $248,098,315, the amount of money on deposit exceeding $30,000,000. The fact that Memphis supports eight exchanges and business organizations of one kind and another, further attests its commercial greatness. The city is now estimated to contain a population closely approximating 200,000, although in 1900 the federal census gave it 102,320.

All this is mentioned simply by way of introduction, for it reveals the magnitude and financial strength of a mid-country point, of comparative recent development, admirably located for all purposes of trade, and about which too little information in particular has gone abroad.

The main office of the Western Union Telegraph Company at this thriving city on the Mississippi River, is located in the Cotton Exchange Building, at the intersection of Madison avenue and Second street, the business heart of the town. This is an architecturally attractive structure, built of red pressed brick, five stories in height. The receiving department on the street level, ample in its proportions, is finished in oak, the public floor being laid in white tiling, in which the letters W. U. Tel. Co. appear worked in blue tile. The operating room occupies nearly all of the top floor. Space is provided for 770 jars of E. S. type of storage battery chloride accumulator.

The receiving and operating departments are connected by tubes, through which the messages are conveyed.

The Cotton Exchange is located on the second floor of the building, directly above the business office of the telegraph company. Henry Hotter is the secretary of the exchange, which numbers among its membership some of the brightest cotton dealers in the country. There is a branch telegraph office on the floor of the exchange which is connected by direct wires with the New York and New Orleans Cotton Exchanges, between which a one-minute service is maintained. C. C. De Lany is the manager of this office.

On the same floor with the Cotton Exchange is also located the Memphis Merchants' Exchange, of which N. S. Graves, an old-time telegraph operator, is secretary. This exchange has also direct wire connections with Chicago and St. Louis, from which points stock, grain and provision quotations are constantly received.

The manager of the Western Union Telegraph Company at Memphis, is E. T. Moore, a picture and sketch of whom appeared in the March 1 issue of TELEGRAPH AGE. J. C. Young is the cashier, C. C. Cornell, collector; Miss Pearl Oberkamp, receiving clerk; R. McElroy, delivery clerk; Miss Jennie Matthews, bookkeeper; Miss Ida Kohnman, stenographer, while Miss Gaynell O'Brien has charge of the service messages. The Tennessee District Telegraph Company performs an excellent service, under the management of G. Soderstrom.

In the operating room J. B. Dillon is chief operator, B. A. Harris holding the dual position of assistant chief operator and wire chief; R. E. Griffey is assistant wire chief; J. H. Oswald, repeater chief; C. T. Raymond, traffic chief, and G. A. Bishoff, assistant traffic chief. Besides these the normal force of operators numbers sixty.

Memphis is looked upon as the gateway, telegraphically speaking, to the Southwest. It is an important repeater point, for all St. Louis-New Orleans, Chicago-New Orleans, Kansas City-New Orleans, Dallas-New York circuits, and one of the Dallas-St. Louis circuits, are repeatered here. The Memphis-New Orleans circuit is considered one of the best working trunk lines in the country. The route followed is over that of the Illinois Central Railroad, of which line Superintendent of Telegraph, G. H. Groce, of Chicago, who co-operates closely in all things necessary to excellence of maintenance, etc., with Superintendent J. R. Terhune, of the Western Union Telegraph Company, at Nashville. The assistant superintendent of telegraph of the Illinois Central, B. Weeks, has his headquarters at Memphis.

The day report of The Associated Press for the entire State of Texas is sent out from this office; the night report being made up and sent out from their own office for the same state, and which is in charge of Thomas A. Ashcroft, a gentleman who has had an extensive experience in press association work in New York and Chicago, as well as at this point.

Within the limits of the business section all telegraph and telephone wires are placed underground.

The ticker service, under the supervision of W. R. Thomas, is a feature of the telegraph at Memphis, especially in transmitting cotton quotations. The installations include about forty instruments.

As the facilities of this office have practically doubled in the past fifteen years and the town has also doubled in size within the same period, it is not difficult to predict that the next fifteen years will likewise witness corresponding growth of population and multiplex business interests. Memphis has a bright future.

Success Through Failure.

Many of our most successful men of to-day owe their success to their first failure, says "Spare Moments." This may sound strange, yet every word of it is true. Their first failure taught them the lesson which they later in life applied so successfully that failure was never again to come to them. It taught them prudence, forethought and deliberation—three of the essentials to success.

It is an old saying that a dollar lost is often a dollars made. The man who profits by failure, who is richer by the lesson learned from failure, is the one to whom when success comes it comes in generous measure.

You lose a dollar in a business venture and you have learned a dollar's worth of experience; this experience makes you careful, you look ahead, you investigate and from that loss you have drawn out again. Every man who has attained wealth and position through his own hard work and skill will tell you that wealth and position has not come to him without failures in the outset. He has perhaps forfeited his first thousand before his second, third or fourth thousand has come into his hands.

Jay Gould once told a young man who asked him how to become rich that he should fail at least once. But, added Gould, "Fail in everything but your courage. Do not become discouraged." Old John Jacob Astor once said, "I lost my first thousand dollars, but that loss made me wealthy. I learned to look at a thing hard and long before I placed my hand upon it."

Some men wait for other men to try a thing, to take the step, before they will venture out themselves. They say, "Let the other man fail or succeed, I'll then know what to do." But one man seldom profits by the lesson taught another man, the lesson must be learned by himself. A dozen men may fail and the thirteenth succeed, men say, and so man seldom profits by the "letting the other man try" theory.

But it takes a courageous man to meet failure. To lose the first hard-earned dollar and not see a hope of another one coming to take its place, will dishearten and daunt anyone but a courageous man. Few men can stand the first failure—it is often their final failure. They never try to do anything, never make another attempt. A second venture, and the lesson taught them by failure instead of preparing them for further trial, simply leaves them discouraged and ofttimes makes of their lives greater failures than the failure wrought to the business has done to invested capital or years of toil and struggle.

It is, too, a strange thing that greatest successes in many men's lives have followed the most seemingly crushing failures. But in all these instances the man who has failed has not permitted discouragement to take too firm a hold on him. He has studied lessons taught him by the failures, and enriched by them he has started out again, worked upon the ashes, so to speak, built upon the ruins of his failure what is to become his gigantic success. He has looked upon his failure as the earth from which he is to take out the ore of success.

If you fail, do not give up. Study the causes of your failure. See wherein your weak and assailable points were, and with courage and determination as your only capital, start out again. You have learned a lesson. Failure has taught you a lot success might never have taught you. It has perhaps taught you one great thing; whether or not you have the courage in you to stand failure, whether you are brave or cowardly—afraid to try again or fearlessly ready to start over again. Failure never comes without bringing its pains and pangs, its sighs and moans. It is hard to stand, hard to live through, but there is in every failure something still left that if we will but study, but consider, we shall find of value to us. It is the lesson taught, the knowledge imparted to us, the experience learned by us. We are better prepared for the second venture. We have learned to know what are the great keys to success. We have been taught prudence, forethought and deliberation; with these three we can often unlock the door to the chamber wherein is stored the chests of gold, the volumes of learning, and the ladder that we must have in order to ascend to the hall of fame. Consider then what your first failure may be able to do for you and then you may look upon it as a successful failure.

International Conference on Electrical Units and Standards.

The International Conference on Electrical Units and Standards will meet in London, England, in the fall. A committee consisting of G. R. Askwith, K.C.; Sir John Gavey, C.B.; Dr. R. T. Glazebrook, F.R.S.; Major P. A. MacMahon, F.R.S.; Major W. A. J. O'Meara, R.E., C.M.G., and A. P. Trotter, has been appointed to prepare a program for the consideration of the delegates. This committee will also make arrangements for the reception and assembly of the delegates attending the conference. Mr. M. J. Collins, of the Board of Trade, will act as secretary to the committee.

The Havana Office of the Commercial Cable Company of Cuba.

The office of the Commercial Cable Company of Cuba, at Havana, Cuba, an illustration of which is shown herewith, is located at the corner of Mercaderes and Obrapia streets, the center of the business district of that city. The superintendent of the company at that point is J. W. Lawson. Prior to his appointment to this position, in September, 1907, he was supervisor of traffic of the Commercial Cable Company at Canso, N. S. The Havana office, which is but a short distance from the water front, is connected with the submarine cable by an underground Okonite cable, leading under the streets of the city. This station works direct with the Commercial Cable Company's central office at No. 20 Broad street, New York, with which an excellent service is maintained. The cable is about fifteen hundred miles in length, and the siphon recorders are the instruments in use.

THE HAVANA OFFICE OF THE COMMERCIAL CABLE COMPANY OF CUBA.

The United States Military Telegraph Corps.

The continued illness of James E. Pettit, secretary and treasurer of the Society of the United States Military Telegraph Corps, and who is the chief operator of the Postal Telegraph-Cable Company, at Chicago, caused that gentleman to feel obliged to resign his official position in the telegraph corps. William Bender Wilson, the president of the Society, has accordingly issued the following circular addressed to comrades:

After twenty-six years of faithful, self-sacrificing service in the interests of this society, performed in the most cheerful and loving manner, Mr. James E. Pettit, our secretary and treasurer, has been compelled to resign his office by reason of impaired health. This necessity I know will be heard by you with profound regret.

To fill the vacancy caused by Mr. Pettit's resignation I have appointed Mr. David Homer Bates, of 658 Broadway, New York, who has consented to serve until our next annual meeting. You will kindly recognize Mr. Bates in all official communications. We all know him as one of the most devoted and distinguished of our members and appreciate his consenting to assume the position.

Members of the society who have not received their certificates of honorable service under the act of January 26, 1897, should write to the Secretary of War, Washington, D.C., for necessary application blanks.

In all cases where members of the corps have changed their postoffice addresses since they last communicated with the secretary's office, they should send their new address to Mr. Bates.

Profound sympathy is expressed on all sides for Mr. Pettit because of his illness, a sympathy that will follow him in his retirement. His warm-hearted personality and long-continued service in behalf of his military comrades, expressed in his devotion to society interests, which he so zealously guarded, have endeared him to a wide circle of friends.

How Municipal Ownership Installs Telephones in Australia.

(Reprinted from an Australian newspaper.)

Numbers of householders who are desirous of installing a telephone are deterred by ignorance of the departmental regulations and the fear of red tape. The procedure is really so simple that a few notes, forestalling the efforts of the proposed post-office publicity department, may prove of interest to intending subscribers.

The first step is to write to the deputy Postmaster-General, stating the position of the premises, and asking particulars of fees payable. By return post you will receive a printed card (Form XO, 982) stating that your letter has been duly received and is having attention. This card is sent by the office boy, and has no real bearing on the subsequent proceedings.

After this effort the department takes a brief rest to recover its strength, and then plunges into a series of abstruse calculations over a period of some weeks. The result of this mountain in labor is an absurdly inadequate mouse, in the shape of a circular (Form CB, 67), informing you that your telephone will cost you five pounds per annum for a maximum of 2,000 originating calls. If this startling example of departmental omniscience does not overpower you you may write to the D. P. M. G., accepting this offer, and instructing him to proceed with the work.

Within ten days, or thereabouts, you will receive another circular (Form C, 1,546), requesting you to sign the attached agreement and pay twelve months' rent in advance. Having done this you may safely take a holiday.

After an interval of, say, a month, it is as well to write to the D. P. M. G., pointing out that you have only a lease of the premises, and are, therefore, anxious to have the telephone as soon as convenient. You will receive no reply to this (Form XY, 1,273, being out of print), but a few weeks later a very civil-spoken young man will present a half-gallon "billy" at your back door, and request a little hot water for breakfast. If you direct attention to the size of the billy the man will point out two of his mates who are sitting on your roof and two others standing in an expectant attitude in your back garden, a sixth man will be found standing at the head of a lineman's hand-cart out in the right of way. The men on the roof are discussing where they will fix your telephone wire, while the men in the garden are waiting to catch them in case they roll off.

If the weather keeps fine the necessary wires will soon be connected, and nothing then remains but to obtain the telephone instrument. After waiting, say, two or three weeks without result, you should write to the daily papers, directing attention to the facts, and signing yourself "Disgusted Taxpayer." On the day following the insertion of your letter the "official explanation" (Form XO, 73) will appear in a prominent position in the news columns. The explanation will set out that the postal department is not to blame, since it ordered seven telephone instruments in 1904, but the demand has been so great that these have already been used. It will further explain that tenders are being called for ten additional instruments, and arrangements are being made for prompt delivery. Again, it will state that all applications are dealt with strictly in order of priority, and as soon as the 1,196 back orders are completed "Disgusted Taxpayer's" application will receive immediate consideration.

The same day's evening paper will contain an interview with the minister concerned, who will express regret that "Disgusted Taxpayer" did not write direct to the department under his own name. The minister will add that he is completely reorganizing the department, and, although only nine months in office, he has already had two telegraph poles repainted and a piece of orange peel picked off the steps of the G. P. O. The interview will conclude with a statement that the minister has "called for a report." This is a most arduous and dangerous undertaking, which cannot be safely attempted by anyone drawing less than £2,000 a year, with prospects of £200 increase.

As the result of the publicity given to your case by the press, a telephone instrument will be sent out to your house, and you must then act with utmost circumspection if you would avoid disaster. Foolish people with no knowledge of departmental methods are apt to directly address the instrument-fitter, saying: "I want the telephone placed here in the hall." This, however, is a fatal mistake. The best way is to suggest, with due diffidence, that the telephone should be placed under the kitchen sink. The fitter will say that is impossible and express his intention of putting it over the drawing-room mantelpiece. At this stage, with a little tact and a violently expressed preference for the sink, you will succeed in having the instrument set up in the hall, where you wanted it.

Your troubles are now over, and at the modest charge of £5 per annum, in advance, you have a piece of furniture, which is an ornament to any house. In the event of your ever desiring to use your new telephone, you should first read the instructions most carefully, and, if you are connected to a suburban exchange, it is always as well to drop a postcard to the manager the day before you ring up. Attention to this little point will insure the prompt attendance of an operator when you do ring, and you will then learn without unnecessary loss of time that the number you want is engaged.

Three months, or thereabouts, after the telephone is installed your name (incorrectly spelled and with someone else's initials) will be duly inserted in the official "Telephone Directory," and earth will hold no further joys in store. It will be seen from this that installing a telephone is a perfectly simple operation, and, if due regard is paid to the hints here given, the whole thing can be fixed up within the year.

The English Marconi Wireless Telegraph Company Announces Change of Policy.

In the annual report of the Marconi Wireless Telegraph Company, considered at a recent meeting held in London, the presiding officer, Sir Charles Euan Smith, referred at length to the changes in company policy. He said in part:

"The policy that I have endeavored to explain, as far as possible, of letting bygones be bygones and of turning our attention to the possibilities of the future is dealt with in the paragraph headed 'inter-communication.' At the time of the last Conference in Berlin, and for many months afterwards, your board undoubtedly felt themselves aggrieved as to the action taken under the direction of His Majesty's government in regard to the Conference, and their acceptance of the principles of international communication, and, in consequence, prompted by sincere conviction our policy for a long time was to endeavor to impress on the various government departments the injury which we considered this acceptance by the government had done and was doing to public interests, in addition to the prejudice that we, ourselves, had received therefrom. The persistence with which we endeavored to gain from the authorities concerned, their adherence to the view which we put before them, was pushed to a point at which it became evident to us that it must cease. We made no practical progress in gaining any adherence to the policy which we wished to see prevail, and the great majority of the directors on the board arrived at a given period, at a decision that this policy should now cease, and that we should no longer maintain an attitude of opposition to the government departments, which had this one single and fatal defect—that stopped all business in connection with them, was very expensive, and in the end was becoming highly prejudicial to the best interests of the company. This was very much the case, also, with Lloyd's. The board, therefore, considered it was in the company's best interests to notify the government that whatever their own convictions might have been, they wished to adopt a course of action that would place them more a rapprochement with the government departments, lead to detente of the strained relations, and lay the ground for substantial and profitable results. This change, which took place in February last, after prolonged consideration, has been productive of promising results. We have indicated to the Postmaster-General our acceptance, under certain provisoes, of the principle of intercommunication, and the post office, on their side, have acquiesced in and promised their most favorable consideration and support to, several very important matters which we consider as material to our welfare, and which, as I believe we shall now receive the support of the post office, the Colonial Office, and the Admiralty, is thus securing compensating sources of revenue, and laying still more firmly the foundation of our future prosperity. The Foreign Office has also recently accorded us their support in a matter of great importance in a foreign country, which has secured for us another most promising field of action. These facts, taken in conjunction with the recommendations made by the select committee, as published in the report, acknowledge our right to be pioneers of practical wireless telegraphy, and recommend generous treatment, and place us, as we may well hope, in a strong position with the government. We trust that our shareholders will approve of what has been done in this matter of policy. Fighting is an excellent thing, as long as one fights for some purpose, but to continue running one's head against a brick wall cannot, from any point of view, be considered a wise permanent policy. I may add that the general terms in which I have just intimated the friendly intentions of the post office have been embodied in a letter from the Postmaster-General, which lays down in so many words, his willingness at once to enter upon a favorable consideration of many of the points which we submitted for consideration.

"As to our general progress throughout the world, we are now securing profitable business all over the face of the globe. America, Canada, South America, France, Italy, Russia, Belgium and China all come to us for apparatus and installations, and we feel from the very nature of the business that the field is almost limitless in its profitable opportunities. Indeed, the board is convinced that within a short time the adoption of a system of wireless communication will become obligatory on every recognized state or nation. As we believe our system to be the best, we are sure that we shall secure at least a large proportion of business offered. Our manufacturing station at Dalston is splendidly equipped and designed to meet all foreseen demands, and our training school for teaching wireless telegraphy is accomplishing all that we hoped for when it was first installed. In Paris, since the beginning of the year 1907, a receiving office had been opened at the headquarters of La Compagnie François Maritime et Coloniale de Telegraphic sans Fil, 35, Boulevard des Capucines, where messages can be handed in for transmission by wireless telegraphy to passengers on board such ships at sea as may be fitted with our apparatus. The French company accepts these telegrams and transmits them to their destination, whether for a short or long distance, by means of the coast stations which the Marconi Wireless Company has established in England, Canada and the United States. This arrangement is one of considerable public utility, and is much appreciated by the French public, as the number of messages handed in and paid for shows a continuous and encouraging increase. As to Lloyd's, our relations with this great association have now been placed on so satisfactory a footing that we hope to avoid, in the future, the litigation that has been not infrequent in the past. We trust, if possible, by friendly communication, to settle any points about which we

may differ. I need not tell you that as regards Trinity House and the Board of Trade, we trust that the installations of our system on the Trinity Lightships which is there reported, may, and should receive great expansion. We think that nothing could be more useful on a lightship than the Marconi apparatus which can deal so instantaneously and effectively between shore and ship. Mr. Marconi, who is possessed of high abilities as a business man, in addition to his scientific attainments, offered, until a suitable business manager had been found, to carry on the management of the company in addition to his own scientific work, in succession to Mr. Cuthbert Hall. So far, he has been singularly successful, and since his assumption of office has succeeded in effecting considerable economies in the administrative staff. It is not, of course, intended for one moment that Mr. Marconi should be permanently burdened with the conduct of the ordinary business details, as his assistance is most needed in the scientific supervision of the affairs of the company. As soon as a suitable business manager can be found, he will be relieved of his duties as managing director. I am glad to be able to announce that he has signed a fresh agreement with the company whereby we have secured his services as technical adviser for a further period of three years."

Railway Signal Association and the Care of Storage Batteries.

At the May meeting of the Railway Signal Association, held in New York, in discussing the question of storage battery cells, it was the consensus of opinion that storage battery cells should be arranged on the racks transversely instead of longitudinally, as is the practice among users of the storage battery in other than signal work.

A paper on the care of storage batteries was submitted by H. M. Beck. The speaker dealt chiefly with the restoration of low cells. He said in part, as reported in the Railroad Gazette:

"The care of a storage battery should have for its object the prevention of low cells, rather than their treatment. The most economical method is to make the expenditure required for the proper care and operation of the cells and this is absolutely essential, if satisfactory results are to be obtained. The tendency is just the reverse: to allow the cells to run as long as possible with little or no attention, and it has frequently required a costly experience to bring about the needed reforms. While the causes of low cells may be varied, the result produced and consequently the treatment required, is not so varied, being in fact, comparatively simple. The general procedure is as follows: (1) Restore the cell mechanically; (2) renew the electrolyte if there is any question as to its purity; (3) restore the cell electrically by charging; (4) determine, if possible, the cause of the trouble. The mechanical restoration covers the operation of examining the cell and putting it back into its original condition mechanically. If the electrolyte were renewed in every case the expense would not be great in the small cells used in signal service and this operation would then be purely mechanical. The electrical restoration has been probably the greatest stumbling block, but it consists in simply charging the cell until a maximum voltage and gravity is reached. The determination of the cause of the trouble is sometimes difficult, but fortunately it is not one of the essentials, and is chiefly of value in preventing a recurrence of the trouble. Thus reduced to its essential elements, the treatment of low cells consists simply of a mechanical overhauling followed by a prolonged charge, and should not be difficult for anyone to grasp. Mr. Beck then gave a very thorough, detailed and clear statement of the troubles encountered in the management of accumulators, due to short circuits, sediment, worn plates, lack of care, impurities in the electrolyte, sulphating, lack of ventilation, and every other possible cause, and told in simple and forcible language how to deal with each; and closed as he began, with the three essential points: Restore the cell mechanically, renew the electrolyte if its purity is questioned, charge to a maximum. In many cases the storing charge is all that will be found necessary."

Mr. Yocum, of the Philadelphia and Reading road, for the committee on storage batteries, presented a printed report consisting of a carefully prepared and detailed description of the storage battery, with rules for installation and care. One of the rules proposed was that every two weeks storage batteries should be overcharged for about one hour. This provoked discussion, as some batteries in places not conveniently reached and not much used are overcharged far less frequently than this. Mr. Stevens, of the Atchison, Topeka and Santa Fe road, overcharges his batteries every sixth charge, no attention being paid to the number of weeks elapsed. The prevailing opinion was that a rule like this—for overcharging on one of a given number of occasions would be satisfactory, and that a time limit was not necessary.

Municipal Electricians.

The annual convention of the International Association of Municipal Electricians will be held at Detroit, Mich., August 19, 20 and 21. Mr. Frank P. Foster, of Corning, N. Y., the secretary, will be glad to answer any inquiries requiring information in regard to this meeting.

A patent, No. 886,624, for an automatic fire alarm, has been granted to William Tom Munro, of East Blairlinn, Cumberland, Scotland. Has two vessels filled with gas, one at a higher pressure than the other. One of the vessels is more easily affected by heat than the other, whereby a gradual change of temperature has no effect, but a sudden change of temperature causes an alarm circuit to be closed.

The Military Telegrapher in the Civil War.

PART FOUR.

As a military telegraph operator, James E. Pettit was one of the most expert, and rendered highly efficient service in the field during the Civil War. Born in March, 1842, he was but nineteen years of age at the date of his first enlistment. His subsequent identity with the military telegraphers took a practical turn, inasmuch as for many years he held the post of secretary of the Society of the United States Military Telegraph Corps, only lately resigning from that office on account of ill-health. He is now and has been ever since the Postal Telegraph-Cable Company established an office in Chicago, the chief operator of that company at that point. He tells the story of the part he played in the military telegraph service in a letter dated at Chicago, July 8, 1878,, and addressed to Colonel William R. Plum, of Lombard, Ill., the historian of the work, recounting the deeds of the military telegraphers. Mr. Pettit's letter in part is as follows:

"Although I had seen active service as a soldier in the field, dating from the first outbreak of the Civil War, for I enlisted in April, 1861, I subsequently returned to civil life, and in 1862 was engaged at my old occupation as a telegraph operator, first at Kenosha, Wis., and afterwards at Council Bluffs, Iowa. But I was anxious to return to the army, and in the following year, 1863, I was appointed clerk in the quartermaster's office in the army of the frontier under General Frank Herron, headquarters in the field, Missouri. In June we were ordered to Vicksburg, and during the siege of that place I ate blackberries and figured vouchers. After the siege I left the quartermaster's service to take charge of the Athens, Ala., telegraph office as military telegraph operator under Captain John C. Van Duzer. Athens was then the frontier post, and end of the line originally running from Nashville to Decatur, and which later was extended to Stephenson, Ala. While there I was driven out once by the Confederate General Roddy, but providentially lost nothing of my effects. At another time the rebel General Wheeler was enabled to pass around us with 2,000 cavalry, but we were too strongly posted for him to disturb, but later, when General Forrest, while acting as a feeler for Hood's advance on Nashville, swooped down upon us, he succeeded in taking us in. The whole force located at Athens was captured, September 24, 1864, including, beside myself, John F. Ludwig, of Laporte, Ind., who is now (1878) manager of the Western Union office at Burlington, Iowa., but who at the time referred to was acting as my assistant. We were taken to Meridian, Miss., where we were confined in the stockade for a while, thence transferred to Selma, Ala., and finally to Cahaba, Ala., where we remained prisoners until March 14, 1864.

"During this time I was ill with typhoid fever for about two months in the rebel hospital. Mr. Ludwig was also ill at the same time and was in the same ward with me. Our prison consisted of an old cotton shed, which was minus one-half of the roof which had been blown off by a gale. This dilapidated old structure was located on the banks of the Alabama River. Within its contracted quarters there were some 2,800 prisoners. I convalesced sufficiently to be able to return to the prison on January 14. The unexampled rains of that season caused the river to overflow its banks, the water running over the prison floor, covering it to a considerable depth. Notwithstanding this condition of things, so prejudicial to human health, we were compelled to remain within the building and adapt ourselves to our surroundings as best we might. We managed to secure some of the cordwood that came floating down the river, and with this we built rude platforms which afforded us at least a dry sleeping place, the regular bunks providing accommodations only for about eight hundred men. The water continued in the prison for over eight days, and when it finally subsided a vast amount of filth remained deposited upon the mud floors.

"As might have been expected, this experience, in my weak state of health, told severely upon me, and when we left the prison, March 14, and arrived at Big Black River bridge, back of Vicksburg, on March 21, after being paroled, I felt pretty shaky. I was placed on the parole line running from Vicksburg to the Big Black River in charge of the office at the rebel headquarters. This line was put in shape merely for the facilitating of the exchange of prisoners. While here I exposed myself too freely to the weather and had a relapse of my prison fever. To this circumstance, regarded almost as an anomaly, must I attribute the preservation of my life, for had I been well enough to have undertaken the trip I should have been a passenger on the ill-fated steamer Sultana, whose boilers exploded at Memphis, causing the death of a vast number. I was not exchanged until the eleventh day of May, 1865, having been a prisoner of war for the period of seven months and seventeen days. I went home to Kenosha, Wis., to recuperate. A month of rest restored me to health and strength, and I returned to Athens, Ala., where I remained as railroad agent, military cipher operator and express agent for some eighteen months, when, the war being ended, the railroad was turned over to the civil authorities. At this time, with all the events of the war still so fresh in mind, mingled with a certain amount of bitterness, wholly natural under the circumstances, I was unwilling to continue in an employ that I might have retained, and therefore gladly obeyed an order to go to Augusta, Ga., as cipher operator. This duty was performed under Captain J. R. Gilmore. At the end of nine months of this work my services as a United States military telegrapher were concluded, September, 1866, and I returned North. The cipher book I used at this point was the new No. 7, the former one, No. 1, was captured when I was taken prisoner at Athens. This in substance con-

cludes a brief outline of my connection with the military telegraph service during the Civil War.

"I might relate many incidents of the war that came under my individual observation, frequently to which I was a party. Many were pathetic in the extreme, and some partook of the humorous. This leads me to remark that I had saved the pants I was captured in, the same I had bought from Platt Burr, then chief operator of the line located at Athens, and for these I was offered the munificent sum of $2,000 in Confederate money on my return to our lines. I kept the pants.

"A short time before my capture, I remember it was a rainy day, General Grenville M. Dodge, then in command of the fourteenth corps, came into the office with a very important despatch addressed to General Veach at Memphis, directing that officer to return to Memphis with his column of men, a force aggregating some 4,000. It was deemed of such importance that no time was to be lost in reducing it to cipher. I called up "N," the call for Nashville, and started in. Before I was three-quarters through, I think I must have been broken by the receiving operator at least some fifteen or twenty times. I knew that no such talent was employed in that office. So I stopped sending, and, calling "N" again, I asked "134" who I was talking to. The answer came, "C." I supposed it was Cass Sholes. I then sent the message rapidly and received a prompt O. K. After my capture I met at Cherokee station the operator who figured in this incident. I think his name was Fowler. He belonged to the rebel General Wheeler's division. He told me he was standing on the railroad track with a tap in my wire and an old relay to his ear. He said he received enough of the message to get the general run of its contents, but that when I whooped it up to Nashville, it was all Greek to him. I also met William Ord, General Forrest's operator at the same place."

Beginning with the issue of June 5 the Railroad Gazette, of New York, and The Railway Age, of Chicago, will be issued as a single, combined periodical under the name Railroad Age Gazette. Offices will be maintained in both cities. This combination merges papers that have had a long existence and made an indelible impress on railroad journalism in this country. The unified paper will show a strong advance upon anything of the kind that has ever gone before. The Railway Gazette was founded in 1856, and The Railway Age in 1876.

A safety device for handling train orders has been invented and patented by W. R. Scott, assistant general manager of the Southern Pacific, at San Francisco, and E. M. Cutting, supervisor of signals of the Western division, of which Mr. Scott was formerly superintendent. The purpose of the invention is to keep operators from forgetting to deliver orders to trains, and this purpose is carried out by locking up the orders and blanks so that the operator cannot get a blank to use for making an order until his signals are displayed in the stop position.

Notwithstanding the decision by the New York Central Railroad to close its telegraph school at Albany, as announced in our issue of May 16, the company has decided upon its further continuance, its closing at this time being deemed inadvisable. Excellent educational work was accomplished at this school which has been conducted under the direction of Mr. C. A. Wood. Mr. Wood having been assigned elsewhere in the company's employ, Mr. Harry Rector has been selected as the new instructor, being transferred from one of the executive departments. He was formerly employed for several years as an operator on the Mohawk division.

Chinese Telegraph Lines.

Consul-General James W. Ragsdale, of Tientsin, submits the following information with reference to the Imperial Chinese telegraph lines, gathered from reports recently published:

At the end of 1906 the administration had a system of 22,419 miles of telegraph lines, with 34,473 miles of wires and a submarine cable of 946 miles; 379 offices, of which 62 were open for day and night service, and 317 for day service only. The number of instruments in actual use was 768. The staff of the head office in Shanghai numbered 67 and the general staff 3,175, while inspectors, linemen, etc., totaled 2,400. In addition there are many provincial lines, usually constructed by the administration, but worked and managed independently by the provincial authorities.

The telegraph companies having connections with China are the Great Northern, Eastern Extension, German, Dutch, and Commercial Pacific, while the French cable connects Touraine with Amoy, a German cable Shanghai with Kiachow and Chefoo, and a third cable, partly Chinese, Chefoo with Port Arthur. China also has frontier connections with Burma, Indo-China and Russian Siberia.

The Court of Appeal at Mombasa, Africa, which heard the appeal of the five natives sentenced to death for the murder of Tom London, who was the telegraph engineer of the cable steamer Colonia, has confirmed the sentence on four of the prisoners, and has altered the sentence on the fifth prisoner to ten years' improsonment. It will be remembered that Mr. London went back into the interior for a brief hunting expedition, from which he never returned, having been waylaid and killed.

Mr. J. R. Yelvington, manager of the Western Union Telegraph Company, at De Land, Fla., a new subscriber to Telegraph Age, says: "I can say that I have found many interesting subjects in the two copies I have thus far received."

CATALOGUE OF BOOKS ON THE TELEGRAPH.

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

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

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

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

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

LOCKWOOD, T. D.—Electrical Measurement and the Galvanometer and its Uses; 144 pages, fully illustrated with diagrams of connections, engravings of apparatus, etc. $1.50.

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LYNDON, LAMAR.—Storage Battery Engineering; 360 pages; 178 illustrations and diagrams; 4 large folding plates; $3.00.

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OFFICIAL DIAGRAMS of the Postal Telegraph-Cable Company's Apparatus and Rules Governing the Construction and Repair of Lines. This book has been produced by authority of the Postal Telegraph-Cable Company, and under the personal supervision of John F. Skirrow, associate electrical engineer. All of the engravings are made from the official blue-prints of the Postal company, and are therefore absolutely correct; 134 pages; 105 full-page illustrations; 50 cents.

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PREECE, W. H., AND SIVEWRIGHT, J.—Telegraphy. A description of every telegraph system and apparatus used in the English telegraph department; ninth edition; with appendix; 504 pages; 272 illustrations; $2.50.

PRESCOTT, G. B.—Electricity and the Electric Telegraph; eighth edition; 2 volumes; $7.

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Book Review.

"Telegraphic Systems," by Arthur Crotch (J. B. Lippincott and Company, Philadelphia, 270 pp., 222 illustrations), a member of the engineer-in-chief's department of the British telegraphs, adds another volume to the works of this author, those preceding it being "Elementary Telegraphy and Telephony," "Telegraph Secondary Cell Installations" and "The Hughes and Baudot Telegraphs." In the present volume the author deals with his subject in the same plain and lucid manner that has marked his previous efforts. His aim has been to give a plain and concise description of the main systems in use in practical telegraphy. In the fourteen chapters comprised within the book, full consideration is given of batteries—primary and secondary; of universal battery working, duplex, diplex, quadruplex, automatic and multiplex telegraphy; the Hughes type-printing instrument, the Baudot system and the Murray type-printing telegraph are reviewed; there are also chapters on test and battery boxes, circuit concentration, repeaters, and submarine telegraphy, the closing chapter being devoted to wireless telegraphy. The volume is carefully indexed, is printed on good paper, the illustrations are well drawn, and the various subdivisions of a great subject are clearly presented. The price of the book is $2, and it will be sent to any address, carrying charges prepaid, on receipt of price. Address J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

Longitude by Wireless.

One of the most interesting propositions for the practical utilization of wireless telegraphy is its use for determining longitude at sea, says the Electrical World. A French commission, headed by M. Poincaré, is now investigating the project which, on its face, looks practicable and valuable. The finding of longitude is and always has been, a very troublesome matter. Practically it amounts to finding at any point the local time and comparing it with standard meridian time carried by the ships' chronometers. In clear weather on land this is a very easy matter, indeed, but at sea with no fixed instruments it is troublesome, and there are often long periods of thick weather during which no observations can be taken, and one must depend upon dead reckoning. Even when good observations can be had there is more or less uncertainty regarding the rates of the chronometers which cannot be checked during the sea voyage, save by comparison with each other. The wireless project is directed to the distribution of standard time signals so that the chronometers can be checked during the whole of a transatlantic voyage as readily as they would be by telegraphic signals or the dropping of a time ball while in port. The plan is to distribute time signals over the whole ocean by wireless from a central station located at some convenient point—the peak of Teneriffe, for example.

Carried out in this way, the chronometer error in the determination of longitude would be practically eliminated, thus considerably simplifying the situation. There still remains the difficulty of finding local time in thick weather. In clear weather, with the chronometer error out of the way, positions can be ascertained with very satisfactory precision. There is, however, another possibility of a somewhat startling character which may yet be realized. If it becomes possible to send out a wireless impulse, that shall travel clear around the globe, finding longitude, will be a very simple matter. For at the speed of electrical waves an impulse would girdle the globe equatorially in about a seventh of a second. A ship 180 degrees of longitude from the sending station would receive two impulses, one from each direction, simultaneously, and one-fourteenth of a second late. At any other place she would get the two impulses received on the same instrument at an interval which depends directly upon her position in longitude. It should be possible to measure this interval, say, by a revolving mirror method with sufficient precision to give a very good position in any weather. Assuming the wave path to be a great circle, a second sending station would enable a ship to get two angular co-ordinates from a known base which would fix her position both in longitude and latitude. Evidently the success of such a process depends on some factors as yet unknown. It is by no means certain that the wave path would necessarily be a great circle or that the speed of propagation would be exactly uniform. If, however, variations from the uniform law were systematic they could be soon ascertained and allowed for. Of course, the interval of time to be measured is very small, but it is nevertheless capable of surprisingly exact measurement, good enough certainly to give a great improvement over dead reckoning. Such possibilities are a strong argument for international control of wireless since the success of such a revolution in navigation as is here outlined would depend upon an international agreement for silence in the ether while the world-wide signals were being distributed.

NEW YORK, WESTERN UNION.

Captain Charles E. Kemp, aged forty-four years, of the police force, New York, died, on May 16. Prior to 1889, when he was appointed a policeman, he was a telegraph operator at this office, where he was well and favorably known, and where he always retained many friendships.

D. T. Sheridan, quadruplex chief, has the sympathy of the force because of the death of his father, which occurred on May 9.

OTHER NEW YORK NEWS.

Assessment No. 479 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of John J. Tidwell, at Shreveport, La.; Albert H. Baab, at Cattaraugus, N. Y.; Harl H. Lee, at Oklahoma City, Okla.; Charles H. Stancliff, at Stonington, Conn., and Charles G. Pond, at Boston, Mass.

Wireless Telegraphy for Schools.

Mr. L. Keys, of the Keys Commercial and Trades Institute, Little Rock, Ark., having met with much success in the transmission of wireless messages in the vicinity of Hot Springs, Pine Bluff and Little Rock, is now extending the field of operations and installing complete and thoroughly reliable outfits in colleges all over the United States, teaching telegraphy. By using wireless transmission students can be taught telegraphy at their homes, which means a great saving in time and expense. The apparatus is inexpensive, and the main sending station being located on the roof of a ten-story building in Little Rock, a large scope of territory can be reached. Where like conditions prevail Mr. Keys feels that many colleges will be able to do good work with wireless. Captain Henry, of the United States Navy Wireless Corps, assisted Mr. Keys very materially with his first experiments.

Mr. W. P. S. Hawk, superintendent of the Postal Telegraph-Cable Company, Salt Lake City, Utah, in renewing his subscription, states: "Telegraph Age certainly gets better all the time."

For $1.50 a year Telegraph Age furnishes its readers with the telegraph information of the world.

Penny-a-Word World Telegrams.

Mr. J. Henniker Heaton, M.P., has an interesting article in the May number of the "Financial Review of Reviews," London, in which he advocates penny-a-word telegrams throughout the British Empire, and eventually throughout the world.

Mr. Henniker Heaton declares that the whole world is suffering from the exactions of a cable monopoly which charges for its service at a rate which is not justified by the cost of working, and he gives figures to show that the only problem to be solved is that of placing on each wire the maximum load. If that were done, he declares, penny telegrams would pay for working.

As a preliminary he proposes that the Home and Colonial governments, acting together, should acquire not only all the land telegraph lines but all the inter-imperial cables lines at a fair valuation and work them for the benefit of the whole people.

"For a quarter of a century I have been in active correspondence with the Postmasters-General of England," he says, "but, able men as they all were, I can unhesitatingly assert that we have never yet had an Imperial official of the kind—by which I mean one with Imperial instincts. During this long period there has only been one conference of the Postmasters-General of the Empire in London.

"I am confident of seeing a penny telegram service in full operation for the entire Empire, the cumbrous and tedious operations of the post office being reserved for the transmission of valuable documents, newspapers, circulars and parcels.

"There is an increasing demand for cheaper telegrams to our Colonial Empire. The immense distances to be covered explains this. It takes from two to twelve or thirteen weeks to exchange letters with a Colonial correspondent, and in order to avoid such a loss of time tens of thousands of people would be willing a spend a moderate sum in telegraphing social and family matters.

"Here we have two nations, Britain with some forty millions, and America with eighty-five millions. Parents and friends are left in the old country, and the young sons who go to the States or Canada often settle down and marry, and so form and strengthen the bond of union between the Old and the New Worlds. Yet of the great total of one hundred million people not one family in one hundred cables one word in a year."

Obituary.

Miss Caroline Tibbitts, aged twenty-three years, a telegraph operator employed at Danby, Cal., committed suicide, May 10, while temporarily insane. Miss Tibbitts, whose home was at Toledo, O., had gone to California for her health.

Luther Ruthrauff, aged sixty-five years, for many years connected with the Commercial News Department of the Western Union Telegraph Company, New York, died at the Soldiers' Home, Bath, N. Y., on May 20. He was at one time located at Macon, Ga.

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North American Telegraph Co., H. A. Tuttle, general manager and purchasing agent, Minneapolis, Minn.

Postal Telegraph-Cable Co., Executive Offices, 253 Broadway, New York; purchasing agent, W. D. Francis, 14 Desbrosses St., New York.

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Of this fine publication, becoming more and more valuable as time passes, we have but a few copies left. The original price was $5. In order to readily dispose of these remaining volumes, and place them where they rightfully belong, in the hands of every telegrapher who failed to secure a copy at the higher original price, we have cut the figure to $1 a volume. On receipt of this amount the book will be sent to any address, express charges to be paid by the purchaser. At this low rate, a sum below the cost of binding the book even, no telegrapher who desires to own a copy should fail to obtain one at this time, for this "bargain" price can never be repeated, as the book will soon be out of print. Address J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

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The popularity of Phillips Code, by Walter P. Phillips, was never more apparent than at the present time. Its acceptance by the telegraphic fraternity, as a standard work of the kind, dates from its first publication, and the constantly increasing demand for this unique and thoroughly tested method of shorthand arranged for telegraphic purposes, has necessitated from time to time the issuance of several editions. The present edition was carefully gone over under the supervision of Mr. A. P. Velie, an expert press and code operator, for many years identified with The Associated Press, New York, a few revisions made and a number of contractions added, until now this "stanch friend of the telegrapher" is strictly up-to-date in every particular. It has been declared that an essential qualification of a "first-class operator" was a thorough understanding of Phillips Code.

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The price of the book is $1 per copy. Address J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

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Directory of Annual Meetings.

Association of Railway Telegraph Superintendents meets at Montreal, Que., June 24, 25, 26 and 27, 1908.

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 Detroit, Mich. Time to be chosen later.

Old Time Telegraphers' and Historical Association, will meet at Niagara Falls, N. Y., September 16, 17, 18.

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 at Fort Worth, Tex., on June 18, 1908.

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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TELEGRAPH AGE

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CONTEN

SOME POINTS ON ELECTRICITY.

A Study of the Duplex Circuit.

(Concluded)

BY WILLIS H. JONES.

In the preceding installment of this article it was shown that the "balance" of a duplex circuit, as indicated by the unplugged resistance remaining in the rheostat, represents the resistance of the external circuit; that is to say, that of the conductor, distant multiplex and battery.

When it comes to the question of measuring the electromotive force of a distant multiplex battery with a voltmeter, or calculating its value by Ohm's law from the current and resistance indicated there are certain precautions and allowances to be made owing to the complexity of the circuit and unreliability of the value of resistance the rheostat indicates. It should be borne in mind that while new rheostat coils are wound practically as marked, there is no real necessity for accuracy, hence a balance may be approximately correct with one, and very much out of the way with another, so far as the figures show, while each, of course, will really contain the same amount of unplugged resistance.

Assuming, however, that the rheostat markings are correct, the different values of current, resistance, and electromotive force at various points in a duplex circuit balancing on, say, 3,000 ohms and equipped with a 200-volt battery, should be as indicated in the accompanying diagram, Fig. 1, provided the wire is free of "escape." Students should study the circuit carefully, as it presents the subject of current division and the drop of electromotive force in divided circuits in a varied and practical form.

In this diagram the line wire proper measures

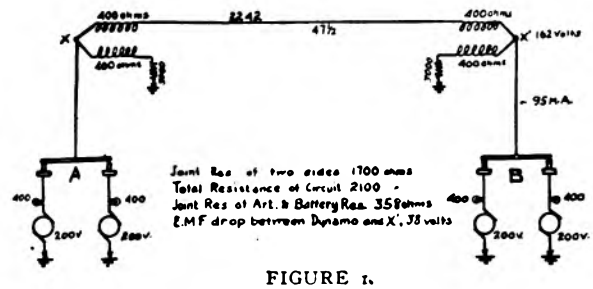


FIGURE 1.

2,242 ohms, and the joint resistance of each set to the incoming current is 358 ohms, while the line coil of the relay adds 400 more, making a total of 3,000 ohms, as the value of the external circuit as indicated by the rheostat.

Now, one would naturally suppose that if we ground the line wire at the main switchboard and measure the current flowing, that the product of its value in milliamperes and the resistance of the circuit 3,000 ohms, would give us the initial value of the multiplex battery creating it, in accordance with Ohm's law, R X = C. Such, however, is not the case where a duplex apparatus is in circuit. The voltage obtained, by this rule, under the conditions stated, would merely represent the diminished pressure of the distant battery at the split X', or, in other words, at the point where the battery simultaneously feeds two circuits, namely, the main and the artificial lines. Hence the true pressure of the distance battery must be equal to the pressure obtained by the formula mentioned plus the "drop" in voltage between the brushes of the distant machine and the split X'. The rule holds equally good when computing the pressure by means of a voltmeter. We cannot read beyond the actual pressure that is feeding the line, except by removing the distant leak which causes the "drop," namely, the artificial line or rheostat.

To demonstrate this point let us recur to the first diagram. Suppose we wish to measure the electromotive force of the 200-volt battery at station B. It will be found that the voltmeter computations will indicate but 162 volts, omitting fractions, and an ammeter 47½ milliamperes of arriving current. If we figure this out by Ohm's law we shall see that these readings are correct.

The total resistance of the circuit the distant battery feeds is, of course, that of the battery lamp, 400 amperes, plus the joint resistance of the main and the artificial lines, 3,400 ohms each, or 1,700 ohms, which makes 2,100 ohms in all. As the voltage drops in direct ratio to the resistance overcome it follows that after the 400-ohm battery resistance it overcome the drop will

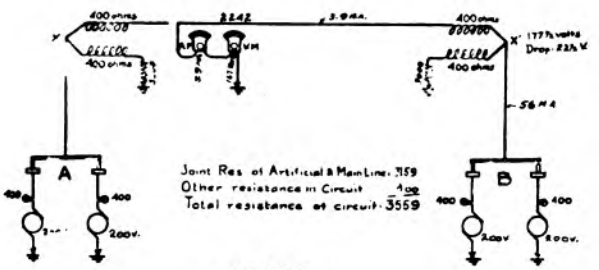


FIGURE 2.

$$\text{be } \frac{400}{2100} \text{ of } 200 \text{ volts} = 38 \text{ volts, hence there}$$

should be 162 volts at X' as indicated.

Again, if the circuit of 2,100 ohms is fed by

$$200 \text{ volts, } \frac{200\ E}{2100\ R} = 95 \text{ milliamperes of current}$$

supplied, all of which flows as far as X' while half of it, or 47½ milliamperes flow through each side of the split.

The drop in the electromotive force of the battery at the point X' may also be shown in another way. The product of the current and the resistance in the conductor represents the value of the pressure necessary to create the volume flowing, hence if we multiply the .095 current by 400 battery resistance the product is 38 volts, leaving 162 volts to feed the two sides of the multiplex circuit and furnish the current to operate the relays. In passing it may be interesting to note the manner in which an arriving current is disposed of. In the circuit shown in the diagram, Fig. 1, the current passes through the line coil 47½ strong, but when it reaches the split X', about 5 milliamperes are diverted through the artificial line, leaving 42½ to find the ground via the lamp and battery. Now, a few words concerning the dial readings of a voltmeter when that instrument is connected with a conductor for the purpose of ascertaining the electromotive force of a distant battery or its value at any given point in a circuit. No doubt there are a great many users of this instrument who take it for granted that the reading of the dial invariably gives the correct information sought when seeking the value of electromotive force at any particular point. This impression is not quite correct. The qualification is this: A voltmeter while strictly a direct-reading instrument, gives a correct value of the original electromotive force existing at the point of connection, only when its connection therewith does not alter the original amount of resistance of such circuit to any appreciable extent.

For illustration—before a voltmeter is connected to the multiplex circuit shown in Fig. 1, the different values of current, resistance and electromotive force should be, normally, as marked.

Now, if we should go to the board and, after removing the home apparatus, insert a voltmeter of 42,000 ohms' resistance in the circuit in series therewith and expect the dial to show but a few volts' pressure to represent the almost totally spent energy at the point of connection; or figure out by such indication that 162 volts is still the pressure at X', we shall be disappointed. Owing to the new conditions now existing in the circuit, all the original values have been altered, as may be seen by a glance at the new markings at the same points in Fig. 2. Instead of the electromotive force at X' being 162 volts, as originally, it is now 177½, yet the voltmeter will indicate but 167 volts. The original drop of pressure between the machine and the split was 38 volts, now it is 22½. The current in the main line has dropped from 47½ to three and one-tenth milliamperes, while the resistance of the line circuit has been increased 42,000 ohms, minus a few hundred ohms in the home apparatus removed. Notwithstanding the apparently incorrect value indicated by the voltmeter dial, it can be shown that the reading is proper and really gives a direct reading of the actual pressure in the circuit as now altered at the point where it is connected. When we alter the resistance of a circuit it is necessary to figure out how much we have lost or gained by the change before we get a final result. According to the voltmeter reading we are short about 10½ volts in making up the 200 volts. Thus 167 + 22½ is but 189½ volts. What has become of the rest? The answer is, 10½ volts were required to furnish 3.9 milliamperes in the main line and 400 ohm relay coil between the split X' and the voltmeter, hence the latter droped 10½ volts.

In concluding this subject we will say that in handling a voltmeter the requirement is that it be used understandingly.

To measure the electromotive force in a closed single line circuit at a given point connect one terminal of the voltmeter to the conductor at the place designated and ground the other, thus making a high resistance leak of the voltmeter coil. If the resistance of the leg of the line conductor is very small compared with that of the voltmeter there will be practically no alteration in the original resistance of the circuit, hence the dial will give directly the information sought. If, however, the leg possesses so high a ratio of resistance to that of the voltmeter that the joint resistance of the two materially alters the conditions the reading

will then indicate something less than the actual pressure existing at that point before the voltmeter was connected. All such losses in electromotive force must be figured out and the result added to the dial reading in order to get the correct value.

Postal Telegraphic Apparatus.

[Under this head there will appear in each issue of Telegraph Age an illustration and descriptive account of some feature of the equipment of the Postal Telegraph-Cable Company, prepared by John F. Skirrow, associate electrical engineer of the company.]

The switchboard block herewith illustrated is a complete switchboard, fuse and arrester outfit for one wire. The block is made of porcelain and is equipped with cartridge fuses, carbon plate arresters and pin jacks. In mounting these blocks it is necessary only to screw them to the wall, no frame being required. A number of these blocks may be grouped together to form a switchboard for several wires, cross connections being made by patching cords, having a solid plug on each end.

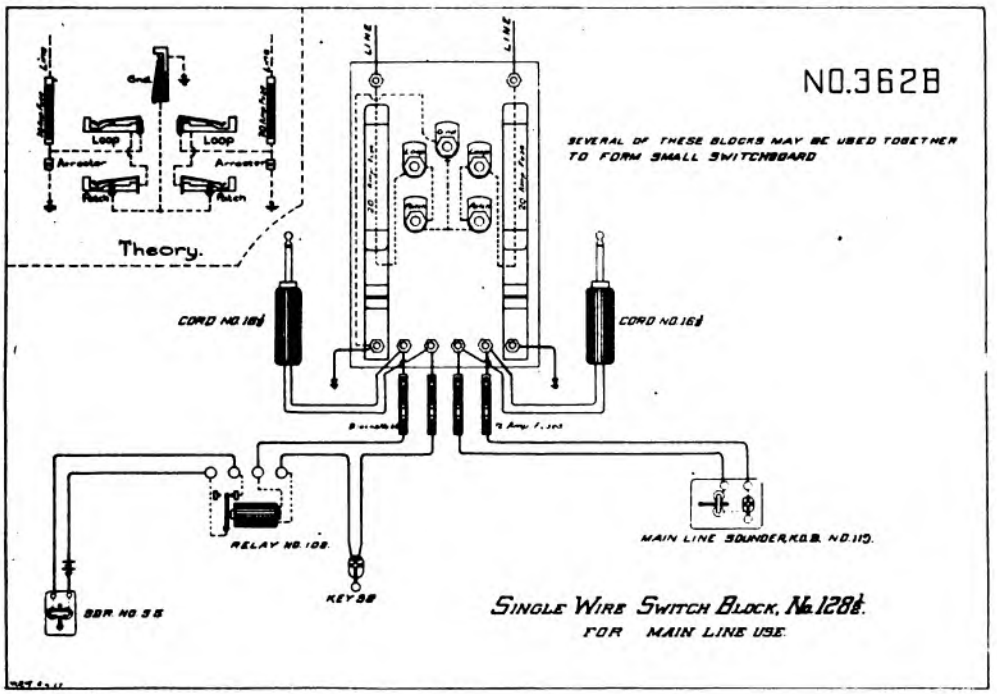
To ground a wire in either direction a solid plug is placed in the ground jack. To open a wire, a similar plug is placed in the "patching" jack east or west as desired. To cross connect wires one plug of a patching cord is inserted in the patching jack of one wire and the other plug in the patching jack of the other wire east or west as desired. To test a patch by grounding at the line, one plug of a patching cord is held against the ground post below the arrester and the other placed in contact with the line where it enters the fuse. Instruments are cut in at the looping jack, being connected up as shown.

These blocks form very convenient and safe switchboards. They can be manipulated by those entirely unfamiliar with electrical connections. They are fireproof and practically indestructible.

Recent Telegraph Patents.

A patent, No. 888,098, for an automatic photo-telegraph, has been granted to Arthur Korn, of Munich, Germany. Selenium cell apparatus having detail features.

A patent, No. 888,154, for an insulator, has been issued to Howard Friend, of Lexington, Okla. Has a specially formed split casting which embraces a two-part cylindrical insulator, so that the single fastening bolt used clamps all the parts tightly in place.



A patent, No. 888,905, for a printing telegraph, has been awarded to Charles L. Krum, of Chicago, Ill. A printing telegraph apparatus in which the messages transmitted are reproduced at the receiving station by being printed upon sheets of paper as in ordinary typewriter work. Complete construction of a magnet-operated type-bar machine, including all the electrical features and circuits for a special code having impulses of different strengths, and different polarities.

The following patent has expired:

Patent No. 452,913, for a septuplex telegraph, held by T. A. Edison, of Menlo Park, N. J.

Personal.

Mr. George M. Myers, of Kansas City, Mo., a well-known old-time telegrapher and capitalist, has been appointed a member of the newly organized Utilities Commission of that city.

Mr. Henry W. Smith, an electrical engineer of Portland, Ore., a former telegrapher, is in New York, the city of his birth, returning hither for a visit. Mr. Smith is accompanied by his wife.

Mr. G. E. Gleason, vice-president and assistant general manager of the Dean Rapid Telegraph Company, of Kansas City, Mo., is in New York on business connected with his company.

Mr. Chester H. Pond, of Moorhead, Miss., an old-time telegrapher, and a member of the United States Military Telegraph Corps during the Civil War, now, and for many years past, prominent in southern business circles, was a recent New York visitor.

Mr. W. L. Truesdell, manager of the Columbus Dental Manufacturing Company, at Columbus, O., formerly manager of the Postal Telegraph-Cable Company, at St. Louis, Mo., was recently in New York and took occasion to call on his many telegraph friends.

Mr. Andrew S. Weir, president of the Electrical Aid Society of Philadelphia, one of the best organizations of the kind in the country, is now associated with the telegraph department of the banking firm of T. E. Allison and Company, that city.

Mr. George H. Kuhn, an old-time telegrapher, now the supreme court stenographer at Lansing, Mich., acting in conjunction with others, has produced an improved system of shorthand, which embodies, it is said, numerous improvements upon the methods now in vogue.

Mr. G. E. Cromwell, an old-time and military telegrapher, for twenty-five years previous to 1893 a prominent figure in telegraph circles in New York, and now living in retirement at Damascus, Pa., was recently in the city and looked up many of his old friends, some of whom he had not seen in years.

Mr. Frank H. Knights, one of the best known telegraphers of Johannesburg, South Africa, and who has visited the United States on two occasions, was married about three months ago at the Transvaal capital and has since that time moved to New Zealand, where he will engage in the telegraph service in that country.

Mr. G. F. Mansbridge, one of the chief officials connected with the government telegraph factory in London, is in this country for the purpose of introducing his patented condenser. From New York he will go to Chicago, and Philadelphia, besides visiting one or two other cities, returning to England at the expiration of two or three weeks.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Col. R. C. Clowry, president and general manager, accompanied by his secretary, Frank J. Scherrer, together with Vice-President G. W. E. Atkins, were in Chicago and St. Louis during the first few days in June on business connected with the company.

Mr. George J. Gould, vice-president of the company, sailed for Europe June 9 for a brief visit abroad, where he will join his family.

Mr. Jacob Levin, of Atlanta, Ga., general superintendent of the southern division, accompanied by Superintendent L. J. Maxwell, of Richmond, Va., recently made an extended trip of inspection through the first southern district. W. P. Cline, superintendent of telegraph of the Atlantic Coast Line Railroad, accompanied Mr. Levin and Mr. Maxwell over the line of his system.

Chevalier Joseph P. Spanier, the Italian general agent of the company, residing at Naples, will be married, July 9, to Mrs. May Heather Jerome, an American lady, at Claridges, London. Mr. Spanier has a wide acquaintance in this country to which he is a frequent visitor.

The following changes have occurred in the service of this company:

Mr. Charles F. Annett, manager of the New Haven, Conn., office for the past three years, has been transferred to the managership of the office at Goldfield, Nev., vice B. S. Jones, who will take a long leave of absence and visit numerous points on the Pacific Coast. Mr. Annett possesses a wide acquaintance in the West, dating back many years, to the time when he was located in Cheyenne, Salt Lake City, and more latterly in Chicago, where he filled the position of assistant superintendent of telegraph of the Illinois Central Railroad.

Mr. J. F. Rawie, who recently resigned the managership of the Toledo, O., office to go to California, has re-entered the service at Tonopah, Nev., where he is acting manager in place of J. L. Morris, absent on a three-months' leave of absence, spending the time in Oregon and Washington.

Mrs. Cree Horner has been appointed manager at Greensburg, Pa., vice Mrs. L. H. Law, resigned.

Miss Jane C. Joyce has been appointed manager at Oakmont, Pa., vice Miss Gertrude Lessig, resigned.

Mrs. H. B. Sells has been appointed manager at Warren, Pa., vice G. S. Walters, resigned.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

President Clarence H. Mackay, accompanied by Mrs. Mackay, visited Reno, Nev., last week, whither he went to attend the presentation ceremonies incident to his gift to the University of Nevada of a building costing $120,000, designed for the Mackay School of Mines. Mr. Mackay also unveiled a statue of his father, likewise a gift by him to the University. Returning East he stopped at Chicago in order to attend the Republican National Convention.

Mr. Charles C. Adams, second vice-president,

will attend the Republican National Convention at Chicago in the company's interests.

Mr. H. A. Tuttle, general manager of the North American Telegraph Company, Minneapolis, Minn., was a recent executive office visitor.

Mr. H. C. Shaw, division electrical engineer, San Francisco, Cal., is in New York on business connected with the service.

Mr. W. H. McCollum, of New York, superintendent of construction, who has been ill with typhoid fever for several weeks at Los Angeles, Cal., has resumed the inspection of lines on the Pacific Coast, a duty in which he was engaged when interrupted by sickness.

The recent retirement, induced by continued ill health, of E. G. Cochrane from the office of general superintendent, announced in the June 1 issue of Telegraph Age, takes from the telegraph service one who represented the best type of the loyal telegrapher. He served the interests to which he was pledged with conspicuous fidelity and ability, while his capacity for work was prodigeous. For more than twenty years Mr. Cochrane was identified with this company, and it is safe to say that no man in the service had a finer record for qualities that constitute the gentleman, and the successful head of an important department. His friendships marked his sincerity. That he was beloved equally by his official superiors and by his subordinates, many of whom have been frankly outspoken in their words of esteem for the man and regret at his retirement, carries with it an expressive testimonial of worth and sterling character that is above all price. As a man and an official in the telegraph service, Mr. Cochrane established a standard.

The following changes have occurred in the service of this company:

Mr. Charles Stewart, manager at Clinton, Ia., has been appointed manager at Springfield, Ill.

Mr. B. F. Rommell, chief operator at Kansas City, Mo., has been appointed manager of that office, vice Harry Morlan, resigned to engage in other business at Dallas, Tex. (See Kansas City Notes.)

Mr. A. B. Matthews has been appointed manager at Topeka, Kan., vice Z. A. Emerson, resigned, to engage in other business at Auburn, Kan.

The Cable.

Three Commercial cables recently broken off the west coast of Ireland by British fishing trawlers, have been repaired and are now in working order.

A patent, No. 888,511, for duplexing telegraph lines, has been granted to Isidor Kitsee, of Philadelphia. Is designed to dispense with the usual artificial cable at each station.

A patent, No. 888,096, for cable telegraphy, has been issued to Isidor Kitsee, of Philadelphia. Has a line with a condenser included therein and a shunt circuit including a polarized receiving instrument, a resistance and a serially connected condenser.

At the annual meeting of the Mexican and of the Central and South American telegraph companies, held in New York, June 3, the old boards of directors were re-elected. W. Emlen Roosevelt was made vice-president of the latter to succeed Charles Lanier, resigned, but who remains as a director.

Cable communication is interrupted, June 11, with:

Venezuela	Jan. 12, 1906
Madura Island (Dutch East Indies)	Feb. 3, 1908
Island of Lanzarote (Canary Islands)	May 18, 1908
Steamer from Las Palmas.	
Demerara	May 30, 1908

Patents No. 888,509 and 888,510, the latter relating to modifications of the former, for a cable telegraphic system, has been awarded to Isidor Kitsee, of Philadelphia. Makes use of an extremely sensitive relay in a cable system, which shall control a circuit or circuits associated with or including a second relay of less sensitiveness, the second relay serving to produce or record messages at its station as received by the extremely sensitive relay, and to repeat such messages received by the extremely sensitive relay into another line or cable.

In the English Parliament Mr. Bellairs lately asked the Under Secretary for the Colonies whether the estimated loss to the British taxpayers (£62,590) on the Pacific cable for 1908-9, was mainly due to the faulty route selected, to the barren rock called Fanning Island, and whether it was practicable, and if so, would the question be considered in conjunction with the Colonial governments, to under-run and relay the cable to Honolulu, so as to benefit British shipping, afford alternative routes by the American cables, and give a fresh route to the Far East? Colonel Seely said the estimated loss on the cable for 1908-9 was £69,000, of which only five-eighteenths would fall on British taxpayers. The route via Fanning Island was adopted in accordance with the desire of the Colonial governments that the cable should touch only British territory. In the absence of suggestions from those governments H. M. Government did not propose to consider the question of relaying the line so as to touch at Honolulu.

Commodore E. Suenson, the managing director of the Great Northern Telegraph Company, Ltd., of Denmark, in a recent report respecting his company, said that during the last two years the number of cables in Europe had been increased by four, the Shetland-Faroe-Iceland cable and the Denmark-Libau-St. Petersburg cable, each composed of two distinct sections. The working of

the Vladivostock and Kiachta routes, he said, had continued to improve. The new cable between Russia and Denmark had to be laid under great difficulties on account of the intricate nature of the Baltic Sea, and the laying consequently required a great deal of skill. The work was, however, successfully carried out in July, 1907, by the cable steamer Von Stephan, belonging to "Norddeutsche Seekabelwerke" of Nordenham (Germany) which company had also manufactured the cable. The length of the eastern section of the cable (St. Petersburg-Libau) was 472 nautical miles, and of the western section (Libau-Stevns) 319 nautical miles, making a total of 791 nautical miles. In the ordinary circumstances the cable was worked direct between the company's St. Petersburg station and the Danish telegraph office at Fredericia, from which place six of the company's other cables landing in Denmark were worked. The telegrams between St. Petersburg on the one side, and England and France on the other side, could thus be sent by the new cable with only one re-transmission, to the great advantage of the service, as regards both accuracy and speed. The value of the cable for the meteorological service had been satisfactorily proved. They had acquired a large new building for the company's offices and station at Shanghai, the most important telegraphic center of China. Parts of this building had been let to the Eastern Extension Telegraph Company and the Commercial Pacific Cable Company, by which arrangement the exchange of telegrams between the three companies would be accelerated. The new offices, which were inaugurated on January 5, this year, contain all the most modern facilities and technical installations. In regard to the difficulties which arose in the Far East as a consequence of the great political changes in that part of the world after the last war, and of the approaching expiration of the company's exclusive privileges in Japan, complicated negotiations had been proceeding. In Japan the negotiations were continued up to February this year, when they were suspended in order to be resumed in Europe, during or after the International Telegraph Conference.

Radio-Telegraphy.

The Spanish government will establish twenty-four wireless telegraph stations. Fifteen of these stations will be on the Spanish coast, seven on the Canary Islands and two on the Balearic Islands. The stations are to be sufficiently powerful to ensure efficient intercommunication between the places mentioned. By the erection of these stations, it is said that Spain will become independent of the present English and German cable systems, and thus the payment of large subsidies will be avoided.

Major Edgar Russel, assistant to the chief signal officer of the army, who was one of the passengers in the Signal Corps balloon which made a flight, on May 13, from Washington to Patuxent, Md., said that the wireless experiments conducted during the flight were highly successful and will be continued. "I think that I can safely predict," he said, "that wireless telegraphy to and from a balloon can be used in war. This means that I am sure that we will shortly perfect an apparatus that can be safely and successfully used in both receiving and sending messages from a balloon to any station within a radius of many miles. Yesterday we carried only a receiving apparatus, and this worked perfectly. We did not try to send for fear of the danger that lies in sparks from the sending instrument. When up over Washington we could receive from the Annapolis station clearly. The apparatus we used was just the reverse of the ordinary type of wireless station. Instead of erecting the antennae on a tall mast we hung them down from the basket, consequently the entire instrument was in reverse of the usual form. We covered the basket with a wire netting, which took the place of the usual counterpoise cables extending from the bottom of the mast in the ordinary mechanism. A wireless telegraph system from balloons will undoubtedly prove most useful in warfare, making the balloon fully 300 per cent. more effective in its destined work of making reconnoissances. With an apparatus similar to the one we carried and with the addition of a sending apparatus a balloon could go up from the headquarters tent on a battleground and, floating over the enemy's position, give the commanding officer exact details of every move made and every position, transmitting this information direct through the headquarters wireless station."

The Western Union Quarterly Dividend.

The Western Union Telegraph Company declared, on June 10, a quarterly cash dividend of one-half of one per cent. This compares with the old rate of one and one-quarter per cent quarterly, which was suspended last January, when a stock dividend was declared. The April dividend also was in stock. Earnings of the company for the quarter ending June 30, estimated in part, show a net revenue of $1,400,000. as compared with $1,537,201 in the same quarter last year, and a balance after interest of $966,938, against $1,148,701 in 1907. Deducting the dividend just declared, $497,556, against $1,217,025 last year, leaves a surplus of $469,388, compared with a deficit in the corresponding time in 1907 of $68,388.

The earnings of the current quarter were larger than in the March quarter, when the net revenue amounted to $1,330,886, with a deficit of $332,276, after the stock dividend of $1,230,100. For the fiscal year the approximate earnings show a net revenue of $3,223,335, as compared with $6,324,210 in the preceding year, and a deficit after dividends of $2,671,188, against a deficit of $36,053 in 1907.

The Barclay Printing Telegraph System.

BY WILLIAM FINN.

PRELIMINARY REMARKS.

In the transmission and reception of the signaling impulses over a main line wire, the Barclay Printing Telegraph system makes use of the telegraph apparatus regularly employed in the operation of fast speed automatic duplex circuits.

This apparatus consists essentially of an automatic transmitter which, under the control of a perforated tape, sends out currents of the required polarities and duration at a high rate of speed; a sensitive polarized relay that responds to the signaling currents, and, simultaneously repeats them into a set of local relays and other apparatus more directly concerned in the operations necessary for printing telegraph purposes.

With the exception, therefore, of the main line relay, the various appliances in use at the receiving end of the line form part of one or other of a number of local circuits, in each of which the current is fixed at the value necessary to meet the working requirements.

Messages for transmission are first prepared on a strip of paper by means of an automatic perforator provided with the universal keyboard. The arrangement of the perforator is such that upon depressing any one of the keys a series of small punches are urged forward and cut clean round holes in the paper strip. The various combinations produced, together with the proper spacing and feeding of the strip, are brought about by selective arrangements that constitute the distinguishing feature of the perforating system, and to which further reference will be made.

It may be here remarked, that under the present signaling arrangement which involves the transmission of six pulses for each letter or character to be printed, only thirty-two combinations or permutations on the punched tape are possible. With that particular number of combinations, fifty-six characters on the typewheel, in addition to the space, paper or line feed, typeshift, and carriage return movements are brought into play. (See Fig. 1.)

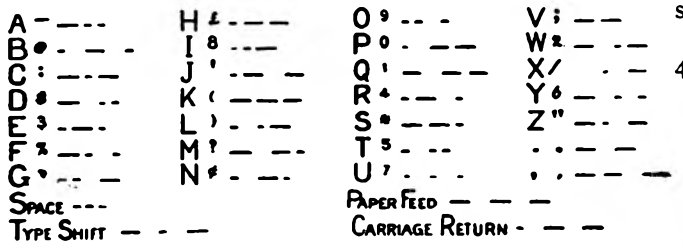
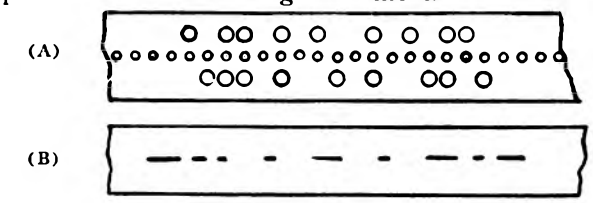


FIGURE 1.

The composition of each combination is such that when the punched tape is run through the transmitter there is transmitted to line for each letter or character, a series of six electric currents or impulses, three of which are negative or marking pulses, and the other three positive or spacing pulses.

In Figure 2 (a), is shown a specimen of the perforated slip representing the letters a, b, c; and in (b) the signals corresponding thereto, as received upon a suitable recording instrument.



(A) Punched tape. FIGURE 2. (B) Received tape.

It will be observed that there are three parallel rows of holes on the punched tape. By means of the upper and lower openings, the movements of a polechanging device in the transmitter can be so determined and controlled as to insure the correct transmission to line of the various signaling currents, which are constantly changing both in direction and time duration.

The center and smaller row of holes is for the purpose of admitting the teeth of a small star wheel with which both the perforating and transmitting machines are provided, and by means of which the feeding of the paper slip through those instruments is suitably accomplished.

This slip is 15/32 inch wide and between four and five thousandths of an inch thick. The correct regulation of and distance between the perforations should be as follows: For dots, which are formed, as shown in Fig. 3, the vertical dis-

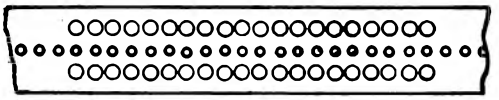


FIGURE 3.—DOTS.

tance from center to center of the upper and lower holes should be one-quarter inch, and from the center of one opening to the center of the next opening taken lengthwise, the horizontal distance should be one-tenth inch.

The center row of holes should occupy a position equally distant between the upper and lower series of perforations.

For dashes, which are formed, as shown in Fig. 4, the top holes should be one-tenth inch in ad-

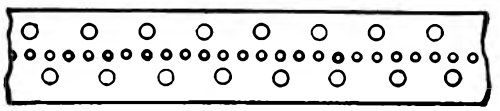


FIGURE 4.—DASHES.

vance of the lower ones, measured from center to center.

The duration of battery contact, and the direction (or polarity) of the signaling impulses are determined by the relative positions of the various perforations.

In the make up of the different characters representing the printing code, marking and spacing impulses of both long and short duration are used

in predetermined combinations to form the printed letters or characters desired.

The length of a marking impulse required to form a dash is three times that necessary in the formation of a dot, and similarly, a long spacing impulse is three times the length of a short spacing impulse.

Between the component parts of certain letters (such, for example, as c, e, h, etc., Fig. 1), short spacing impulses flow to line; in others (such as b, u, x, etc.), the longer spacing impulses are transmitted; while between the elements of some letters (as d, f, g, etc.) both long and short spaces comprise part of the character impulses.

The regular "space" or distance between the various words, groups, etc., on the printed message, is secured by the punching of three dots (Fig. 5) at the end of each word, figure group, etc., on

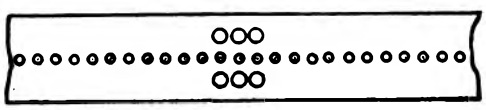


FIGURE 5—"THE SPACE."

the prepared tape. On a Wheatstone receiver the corresponding signals would be registered thus: ····· but as these signals are produced by means of short pulses alternately negative and positive, no combination is set up in the selective apparatus. The long spacing pulse, however, which follows this series of dots, finds a path open to it through the spacing magnet, the energizing of which operates the spacing attachment of the printer, and in this way leaves a blank space upon the paper.

(To be continued.)

The Railroad.

Mr. A. E. Roome, superintendent of telegraph of the Southern Pacific Company, at San Francisco, Cal., has resigned.

Mr. W. F. Williams, superintendent of telegraph of the Seaboard Air Line Railway, Portsmouth, Va., was a recent New York visitor, as was also Mr. W. W. Ryder, superintendent of telegraph of the Chicago, Burlington and Quincy Railroad, Chicago.

The Delaware, Lackawanna and Western Railroad Company will soon begin to operate its trains by telephone over the Scranton-Binghamton division. Probably in the course of a year the train despatching over the entire system of this road will be conducted by telephone in supersedure of the telegraph.

Mr. George L. Lang, formerly superintendent of telegraph of the Queen and Cresent system, with headquarters at Chattanooga, Tenn., but who has been in retirement for the past two years, was a recent New York visitor, where he took occasion to call on numerous friends. After a brief visit to Boston, Mr. Lang returned South and in future will make his home in Chattanooga.

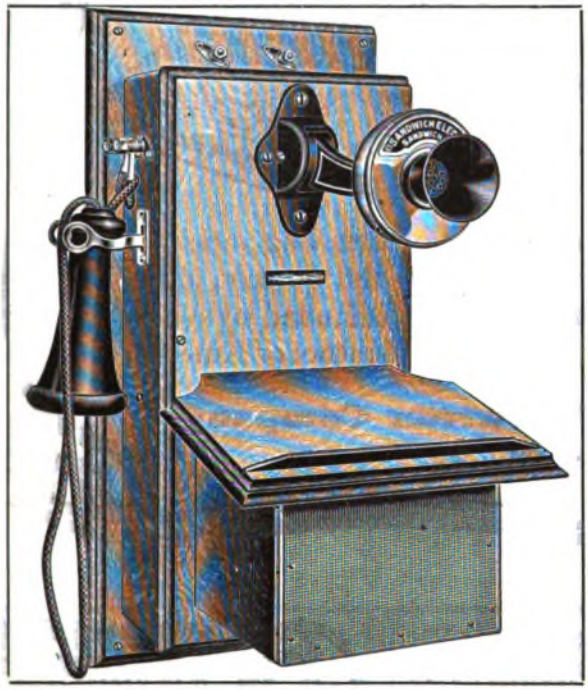
Mr. S. K. Bullard, of Sedalia, Mo., superintendent of telegraph of the Missouri, Kansas and Texas Railway system, is taking a rest of a year at Redlands, Cal., whither he went in December last. This is a well-earned vacation for Mr. Bullard and was entered upon after a service of thirty years in the railway system to which he owes allegiance. During his absence Mr. William H. Hall, the assistant superintendent of telegraph, is performing the duties of the office.

The typewriter has usurped the place of the pen to such an extent in many departments of business that penmanship, at least so far as legibility is concerned, is almost a lost art. For the purpose of putting a record that this does not conclusively apply to the railroad service, the Railroad Gazette publishes a reduced fac-similie of a written train order conspicuous for its perfect legibility, although free from all attempt of fine writing, remarking that "at places where a machine is not available, it is refreshing to find an operator who can produce readable copy." The order in question is written on a form of the Nashville, Chattanooga and St. Louis Railway, the paper quoted stating that the train orders on that road "are carefully and constantly inspected by a sharp-eyed man from headquarters, and not only is slovenly penmanship rigidly subdued, but any tendency on the part of despatchers to use ambiguous wording also is nipped in the bud."

J. B. Sheldon, Union Pacific Superintendent of Telegraph.

John Burwick Sheldon, lately appointed superintendent of telegraph of the Union Pacific Railroad, with headquarters at Omaha, Neb., elevates to that position on a great line of railroad, a telegrapher well fitted by long experience for so important a post. Like many another who has climbed the ladder of promotion, Mr. Sheldon has risen from the bottom. The fitness of the man for the place to which he has been advanced may be estimated from the fact that he succeeds L. H. Korty, lately retired on account of ill health, after a successful tenure of office of many years. Mr. Sheldon was born at Ottawa, Canada, August 15, 1860. In the spring of 1873 he became a messenger in the employ of the Montreal Telegraph Company in his native place. Learning telegraphy he held positions as an operator in various cities in Canada and the United States, finally accepting the place of night operator in the general telegraph office of the Union Pacific Railroad at Omaha, on January 1, 1882. In September, 1884, he was promoted to be manager, a position he continued to hold, together with exercising a supervision of all telegraph and telephone circuits and multiplex apparatus until appointed to be superintendent of telegraph on May 6. An engraving of Mr. Sheldon appears among those of other superintendents of telegraph, published elsewhere in this issue in connection with the story of the convention of the association to be held at Montreal.

Railway Composite Apparatus



STATION TELEGRAPHONE NO. 7.
Patent Nos. 831,525
839,210
882,847

Under ordinary conditions this instrument will operate a distance of 100 miles on an iron Morse wire, and twice that distance on copper, and any reasonable number of instruments can be operated on one circuit.

Made in the following types:

Station, Caboose, Portable, Siding, Iron-box : : : :

Kindly furnish us with a diagram of the line upon which you wish such service and we will be pleased to give you the desired information.

SEND FOR OUR LATEST CATALOGUE

THE most commercially satisfactory composite telephone ever devised. All instruments equipped with the howler call and absolutely non-interfering with the Morse circuit.

Four cells of No.6 dry battery is all that is necessary for both talking and signaling, and renewals required only three or four times per year.

All caboose and portable sets equipped with jointed pole and one hundred feet of flexible cord for making connection with the line wire.

We have hundreds of these instruments on many of the largest railroads of this country and Mexico and perfect satisfaction is being obtained.

SELECTIVE CALL

Our selective calling device for telegraph offices is an entirely new innovation, operating on a reversed current; it is not continually in motion and can be operated only by the dispatcher.

Can be used on both single or metallic circuits.

Will work on the same Morse way wire with no action of mechanical parts excepting when call is being made selectively.

Has been in operation for some time on one of the largest roads in the country and without a failure.

Calls can be made individually, consecutively or in groups.

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SANDWICH, ILL

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JUNE 16, 1908.

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.

Telephone and Telegraph Investigation.

A resolution was adopted by the United States Senate on May 28, introduced by Senator La Follette, directing the secretary of the Department of Commerce and Labor to "institute an investigation into all the telegraph and telephone companies engaged in the conduct of an interstate business as to the methods used in handling the public's business, the wages paid telegraphers, telephone operators and other employes of such corporations," and also to get a statement of the receipts and expenditures of the companies.

As a matter of fact the information called for by this resolution has already been carefully compiled and was published and distributed by the Department of Commerce and Labor, in 1907. Secretary Straus is quite right in remarking, as he is reported to have done, that the information called for by the resolution may be obtained without great difficulty.

Telephone Train Orders at the Convention.

The railway superintendents of telegraph will discuss many important subjects at their coming convention at Montreal, but none of the questions that will be brought up for consideration at that meeting are likely to elicit more interest, or arouse a more earnest discussion, than the transcendent one at this time of the telephone viewed in its important relations to train despatching. The substitution in large measure of the telephone for the telegraph in this particular, while perhaps to be expected consequent upon gradual and natural change, has nevertheless been hastened in its advent and forced upon the attention of and acceptance by railroad management by adverse legislation. The result has been, however, to place pressure upon intelligent thought and stir it to greater activity; to give a larger consideration to expediency and to stimulate invention. The sudden awakening to the adaptability of the telephone for all purposes of train despatching, and the very general acceptance of the idea, has come with a rush. It cannot be doubted that it has come to stay, for it has proven its usefulness and value. The realization of this fact is significant, and no doubt its discussion at the convention will be profound, interesting and extended. A further discussion will also probably relate to the train mail service, now coming into familiar practice, as a carrier of messages which heretofore were transmitted by wire. The full story of the convention is told in other columns of this issue, embellished with abundant illustrations, showing the personnel of the railway telegraph superintendents.

An Unfortunate Wording in a Telegraph Bill.

Some men go off half-cocked. Their zeal frequently outruns mature judgment, and the old Latin proverb of *Festina Lente,* in its interpretation of "hasten slowly," apparently has no place in their ethics, their understanding or their vocabulary. Congressman Cary, of Wisconsin, the whilom telegraph operator, affords an apt illustration of this generic proposition in the wording of his bill relating to the sending of telegraph messages, a paper alike unfortunate in its inspiration and its preparation, now quietly reposing in a state of desuetude, so left by an adjourning Congress.

In a hearing before the House Committee on Interstate and Foreign Commerce, at which George H. Fearons, the general attorney of the Western Union Telegraph Company, and G. W. E. Atkins, a vice-president of the same, appeared in behalf of that corporation, a feature of the argument concerning the filing of the time on all telegraph messages sent, was invested with a broad sense of humor.

In the first place, Mr. Atkins gave some inter-

esting statistics bearing on the telegraph, and leading up to the subject referred to, carefully explaining and clearly defining the attitude of his company. He said that the average telegraph message consisted of about thirty words—that is, including the date, address and signature, and body of the message. To transmit these filing times and transmission times would take an average of three and one-half words for each time notation. That would be seven words for each message. The Western Union Telegraph Company handled during the year ended June 30, 1907, 78,804,551 messages. If the company had been required to transmit seven additional words for each of those messages, in order to show the time they were filed and the time they were put on the wire, it would have handled 523,631,867 additional words at the regular count. Reducing those words to messages, the company had, he said, the equivalent of 17,454,395 more messages than were transmitted, and that would all be free of charge.

In reply to inquiries made by a member of the commission, Mr. Atkins in explanation of his statement said that he arrived at the seven-word basis in this way:

"Here is, for instance, 'Eight a. m.' That means two words; 'eight' is one, and 'a. m.' is another. 'Eight one five a. m.' is four words (8.15 a. m.). 'One nought a. m.' (10 a. m.) is three words. 'One nought five a. m.' (10.15 a. m.) is five words. There you have four combinations of time which foot up fourteen words. Dividing this number of words by the number of combinations, you have an average of three and one-half words for each combination of time. Now, that would double, because you transmit the time of filing and the time it goes on the wire. That makes seven additional words for those two timings on a telegram that is transmitted over the wire. In addition to that the bill requires that the time of receipt shall be indorsed on the messages delivered. That, of course, necessarily takes a little more time when the operator is receiving the message, although it is not transmitted over the wire."

At this point Congressman Cary, the author of the bill, interrupted the proceedings to question the accuracy of Mr. Atkins's statements by asking whether it was "stated in that bill that you must forward the filing time twice?"

Upon being informed that the filing time and the time of putting it on the wire were provided for in the bill, Mr. Cary quickly asserted with a show of irritation: "I do not think so. I think the bill says the filing time must follow up the message; that is all." To this Mr. Atkins made the dry rejoinder: "It is your bill. You ought to know what it provides for, but it is as I have stated."

At this juncture, by way of a clincher, Mr. Fearons, the general attorney of the Western Union Telegraph Company, read the following sections of the bill in question:

(c) The above-described notations of the month, day of the month, and hour and minute of the day when such message or telegram is received for the above-provided transmission shall be forwarded with said message or telegram and as a part of said message or telegram, and at the cost and expense of said firm, person, co-partnership, association, or corporation accepting such telegram for transmission.

(d) In addition to sending the time described in subsection (c) there shall be forwarded as part of said telegram the hour and minute of the day at which said message or telegram is placed on the wire for transmission by the operator sending or forwarding such message or telegram, and at the cost and expense of said firm, person, co-partnership, association, or corporation accepting such telegram for transmission.

In concluding, Mr. Fearons remarked laconically, "the gentleman ought to read his own bill."

Public Control in Saskatchewan, Canada.

Briefly stated, the policy of the Saskatchewan (Canada) government creates a department of railways, telegraphs and telephones, and gives to this department control over all telegraph and telephone systems which may hereafter be constructed or acquired by the department, remarks the Western Electrician. The policy makes the building of long-distance telephone lines a provincial undertaking, chargeable to the province as a whole. It makes the matter of municipal telephone construction a municipal undertaking, chargeable to the municipality and controlled by the municipality. It makes the construction of rural telephone systems rural undertakings, chargeable to those who desire to unite as communities to secure the benefit of the telephone, and managed and controlled by them, and assisted by the government by a free grant of the poles, which is said to represent sixty per cent. of the cost of the construction of lines in Saskatchewan. The money to provide the construction of the long-distance lines will be provided by the issue of provincial debentures; that of municipal systems by the issue of municipal debentures, and for rural systems by the organization of joint stock companies, assisted by the provincial government. The long-distance, municipal and rural systems are united into a provincial system by provision in the bill for compulsory connection of all the systems upon an equitable basis.

The Austrian telegraph department, according to an article published in a foreign contemporary, has lately used for its larger installations a new type of cable in which the insulated conductors were covered with a layer of tin-foil in order to diminish and dampen the mutual induction of the conductors in the cable. While for telephone cables this arrangement has been effective in producing a certain amount of damping, it has been denied that it would be effective for telegraph cables. The writer of the article referred to has made an extended investigation of this problem with the aid of an oscillograph.

Mutilation of Telegraph Signals.

BY JOHN F. SKIRROW.

[A paper pointing out in terse, vigorous and almost paragraphic form the various causes for the sudden mutilation of telegraph signals, was prepared for official use a short time ago by J. F. Skirrow, the associate electrical engineer of the Postal Telegraph-Cable Company. While to a certain extent academic in character, it nevertheless furnishes an amount of information on common subjects pertaining to the telegraph so clearly phrased as to invest the matter with unwonted interest, showing the author to be of discriminating mind and skilled in expression.—Editor.]

Telegraph signals are transmitted by imposing an electrical current upon a wire for periods of long or short duration with variable intervals between these periods. Signals are also transmitted by reversing the direction of the current upon a wire or by varying its strength. In multiplex telegraphy two or more of these methods are used upon one wire simultaneously.

When electric currents are transmitted over wires strung on pole lines it is necessary to use an insulating material (such as glass) at each point of support, to prevent leakage of the current to earth or from wire to wire. Moist surfaces are much better conductors of electricity than dry surfaces, and it will thus be seen that a rainstorm, which drenches line wires, insulators and poles, allows leakage to the earth, and to other wires upon the pole line, at every point of support. Wet snow, sleet and fog have the same effect. The effect of such leakage is to materially reduce the amount of current which reaches the distant end of the line.

Under such conditions the received currents are weak or erratic, and the receiving instruments respond sluggishly, failing occasionally to respond at all. Such failure by a receiving instrument to respond frequently results in combining or distorting signals so as to entirely change their significance.

It is often necessary to operate telegraph circuits during the prevalence of conditions which render their operation imperfect. Wet foliage swinging against wires during rainstorms makes variable leakage. It is impossible to adjust receiving instruments to exactly meet the constant variations of the received currents, and false signals are therefore often recorded under such conditions.

Lightning seeking a path to earth finds in aerial wires a ready route. When lightning discharges into a telegraph circuit the effect is to either reverse or augment the current passing over the wire, or to bridge in an interval between currents. The result is mutilation of the signals. During severe lightning storms lines are frequently rendered entirely inoperative, and when partially operative the signals are subject to much mutilation. The effect of such storms upon the signals is often noticeable at receiving stations when the storm causing the effect is at the transmitting point or en route, possibly a hundred or a thousand miles away.

In addition to these atmospheric causes, marked effects upon the signals transmitted over telegraph circuits have been noted during the prevalence of sun spots. Many theories have been advanced for the cause of magnetic and electrical disturbances during the prevalence of sun spots, but little is known except as to the results. Many examples are known of magnetic storms attended by aurora borealis and coinciding with violent disturbances of solar spots. These magnetic storms seem to have an irregular period. There was one in the winter of 1881-1882, another in the summer and fall of 1892, one in the summer and fall of 1903, another in the spring of 1905. During the prevalence of these storms telegraph circuits are seriously affected. On November 1, 1903, many telegraph circuits in both this country and Europe were rendered inoperative for some hours. On March 6, 1905, all of the circuits out of the Postal Telegraph-Cable Company's Chicago office were entirely inoperative for thirty minutes at a time, at intervals during the afternoon. The effect of such storms is to charge telegraph wires with a surging current which mutilates all signals transmitted. Disturbances of this nature but of lesser magnitude are frequent.

Beside the foregoing atmospheric phenomenon another appears in northern latitudes in the shape of highly charged snow clouds, driven by the wind along or across telegraph lines. The highly electrified particles of snow that are brought in contact with the wires yield up their static electricity to them, resulting in current that flows along the wires to the earth. In northwestern states such electrical snowstorms have, upon several occasions, seriously crippled the telegraph service by rendering unworkable some or all of the wires that passed through the region where the storm prevailed. In New Mexico, Arizona and Southern California the wires are annually crippled during the spring by somewhat similar phenomena caused by dry sand. Particles of dry sand in those regions become in some manner highly electrified, and during the sand storms which prevail there, are driven across and along the wires, and yield up their electric charges to them in the same manner as does the snow in the northern latitudes.

There is a marked difference in the manner in which the currents from snow and sand storms, and those due to the action of aurora borealis affect the operation of the wires. In the former case the disturbance from the current manifests itself at the contact points of the transmitting apparatus in the form of a spark or discharge which mutilates the signals. In the latter case, the auroral currents traveling in the wires act very much in the same manner as currents from a battery, but are of variable pressure, causing a current to flow in the wire, sometimes steadily in one direction, and occasionally changing its direction of flow at short intervals. At times

these currents have remained so steady that the batteries have been removed and the transmission of telegrams effected for several minutes at a time, by the auroral current alone.

When two neighboring wires are parallel, one of them, although not in contact with the other, is electrified by currents passing in the other wire. This electrification is known as induction. When telegraph pole lines are located upon the same roadway or near high-tension electric light or power circuits, signals are affected and often mutilated by induction from such circuits. On March 10, 1907, the Postal Telegraph-Cable Company's wires northwest of Toledo, Ohio, were disturbed to such an extent from this cause that it was impossible to do any business on them between the hours of 12.30 A. M. and 6.15 P. M. and on March 11 between 7.30 A. M. and 11.58 A. M. We have had similar disturbances recently on wires paralleling the New York, New Haven and Hartford Railroad.

During the prevalence of very high winds wires sometimes swing together. The result of two wires coming in contact is a transference of current from one to the other, mutilating the signals. Broken branches or limbs of trees become entangled among telegraph lines during lightning and wind storms and cause leakage between wires, with consequent mutilation of signals. By accident or design metal hay ties are frequently thrown up among telegraph wires. These hay ties swinging from side to side make momentary contacts between the various wires, allowing interference of current and causing mutilation of signals. On account of their intermittent nature faults of this kind are difficult to locate, and they cause much interference and mutilation until they can be traced and removed. Kite tails are a prolific source of trouble on telegraph circuits. The strings of these tails connecting with several wires provide a ready path for electric currents when they become soaked during rainstorms and mutilation of signals results.

One effect of the sudden changes in circuit conditions resulting from the various causes enumerated is arcing or sparking at the transmitter points of the sending station. Another effect is the changing of the strength, direction or duration of the current, reaching the receiving station. In either event multilation of the signals results. Pole lines of various telephone, telegraph and other companies are often located upon the same side of the roadway. Under such conditions linemen repairing or replacing broken wires, or stringing new wires frequently cause interference. Wires in process of being strung sag down upon or swing among other wires, making momentary contacts. Similar interferences occur at intersecting points when wires are being strung upon a pole line which crosses over another pole line. During building operations nearby pole lines are often interfered with by the transfer of lumber. Boards are transferred from the sidewalk to the upper part of a building by being passed up one at a time from story to story. It frequently happens that these boards strike the telegraph wires while being transferred, and mutilation of signals results. Derricks and cranes are used for construction work upon railroads and other rights of way. The booms of these cranes are often swung around so that they strike the telegraph wires. This causes momentary contacts between wires and false or mutilated signals.

In a line one thousand miles in length several of the conditions enumerated may obtain at the same time.

Commercial Telegraphers' Union Convention.

The Commercial Telegraphers' Union of America has just concluded its annual convention at Milwaukee, Wis., the first session being held on June 8. Delegates coming from numerous cities were in attendance. President W. W. Beattie delivered an address welcoming the members, in which he spoke words of encouragement, expressing confidence in the principles of the union and hopefulness respecting its future welfare. A number of reports were read. It was shown that the treasury was in a depleted condition, the strike of last year wiping out all accumulations, yet hope was expressed that a fund of $200,000 might be raised, an amount it was thought which could be secured by means of a per capita tax. There was a notable lukewarmness of feeling respecting the question of inaugurating another strike, the possibilities of which have been hinted at of late. Lack of funds and the difficulty of raising money exerted an influence among members to conservatism of thought and action.

An election of officers resulted in the choice of S. J. Konenkamp, Pittsburg, president; C. W. Saults, Winnipeg, Man., vice-president; Wesley Russell, Chicago, secretary and treasurer, with an executive board as follows: C. E. Hill, Toronto, Ont.; Percy Thomas, New York; James B. Finnan, St. Louis, and Dr. C. M. Worth, Denver, Colo. The next convention, to be held in 1910, will be at Atlanta, Ga.

The Turning Point of Andrew Carnegie's Career.

Readers of Telegraph Age and members of the telegraph and electrical fraternity generally are always interested in anything relating to Andrew Carnegie, who in his early life learned to telegraph and who has often referred in his writings and public addresses to his pioneer work in that line. As a telegrapher, then, Mr. Carnegie possesses an individuality especially appealing to members of the profession, and an article bearing the title of "The Turning Point of Andrew Carnegie's Career," contributed to the July number of the Century Magazine by David Homer Bates, and which dips into telegraph reminiscence of historical value, will afford matter of abundant interest to the telegrapher.

The Military Telegrapher in the Civil War.

PART FIVE.

John Lonergan had an active career in the Civil War as a military telegraph operator. In this capacity he displayed much skill and resourcefulness and personal bravery in the performance of his duties, characteristics, it may be remarked, which were shared in common and to a notable extent by the brave men who served their country at the key in the field in the time of its peril. Not much more than a youth when the war broke out, for he was born in 1843, he nevertheless did a veteran's part in the work that fell to his lot, and did it so well as to elicit the warm approval of Gen. George H. Thomas. In writing in 1878 from his home in Marysville, Kan., where he still resides, to Colonel William R. Plum, the historian of the military telegraphers, he gives in the following straight-forward and modest way, graphic in its very simplicity, an account of the part he sustained during the war, recalling the events, however, wholly from memory, the great fund of data, including many interesting letters, which he had accumulated, having previously been destroyed by fire:

"Shortly after I entered the field service of the military telegraph in March, 1863, at the headquarters of General Rosecrans, I was sent with five other operators to the Department of the Ohio, where from April to July, 1863, I was engaged on outpost duty at Stanford and Crab Orchard, Ky. While at the latter place I had what I may call my first 'war experience.' The rebel forces raided the town one morning about daylight. Attired in my night clothes only I managed to escape capture by hiding under a chicken coop, in front of which a friendly negro woman rolled a big log of firewood which shielded and completely held me from view. The enemy were quickly repulsed and driven out and I soon found release. Yet the situation into which I was forced was very realistic during the time it lasted, even though it was not free from its humorous side. It is not unbecoming a veteran, presumably brave, to remark that the comic side of the affair is more potent at this safe date of review than when it occurred.

"During General John A. Morgan's raid in Kentucky that year, when I was at Stanford, George A. Ellsworth, the famous operator attached to that rebel leader's command, tapped our line at or near Lebanon, but as we were expecting some such maneuver on his part he gained no information by his action. By using our operator's name at Lebanon, George Purdon, however, he got a train to leave Lebanon Junction which he captured, and among his prisoners was the operator at Lebanon Junction, by name Atwater, I think.

"I returned to the Army of the Cumberland July 9, 1863, reporting for duty at headquarters at Winchester, Tenn., and a few days afterward accompanied General Sheridan to his headquarters at Bridgeport, Ala. While at General Rosecrans' headquarters the general insisted on my sending a despatch during a thunder storm and I was knocked senseless by lightning. The advance of the army on Chattanooga from Bridgeport took place September 5, 1863. I was paired off with Wallace Forbes, Captain Batchelder and Lieutenant Connolly of the signal corps and by wire and signals kept communications open with the advance and rear.

"After the battle of Chickamauga, I was assigned to General Crook, commanding the Second Cavalry Division. While with this officer I forwarded despatches to General Sherman who was advancing eastward along the Memphis and Charleston Railroad. We experienced considerable difficulty in keeping our wire up between Stevenson, Ala., and headquarters at Maysville, Ala., as the Fourth Alabama Cavalry kept constantly raiding the line, and General Crook had to string out Colonel Long's cavalry brigade to patrol and repair the wire.

"At Brownsboro, Ala., I was forced to leave my office by the repeated night attacks from the rebels on the west bank of the Flint River. General Crook had me move my office to his headquaarters at Maysville, a mile distant, as he could not give me sufficient protection at Brownsboro without drawing from a direction that he deemed of more importance.

"In 1864, during the Atlanta campaign I was used as a floater; that is, I was sent where most needed. October 10, 1864, I was assigned to General O. O. Howard, commanding the Department and Army of the Tennessee, as cipher operator, with whom I remained until May 25, 1865. During this time I was associated with C. G. Sholes. He left us at Savannah, Ga. During the march from Atlanta to Savannah, I tapped the rebel wire in the rear of General McLaws' headquarters near station 7. Major Whittle, assistant provost marshal general, Captains Taggart and Bedford, adjutant general, and L. A. Sampson of the signal corps were with me. I intercepted messages from General Hardee to General McLaws, giving the movements of General Bragg on our rear from Augusta, also of the cavalry, the number of rations forwarded to McLaws, etc., which gave us information that was greatly desired. General Howard directed me to make an official report of the same for the benefit of General Sherman.

"I got a severe scolding, however, from General Howard for sending a message signing his name to it to General Hardee, inviting the latter to remain at Savannah and dine with us Christmas. Captain Bedford who suggested the message did not get off so well, but fared worse. General Howard felt very sore about it, as he said that he had every respect for General Hardee socially. While in front of Savannah and during the battle of Kings Bridge road, I tapped the Gulf line at Miller's Station and in full view of the rebel line of battle. General Howard was with me in person. We barely escaped capture. The timely

arrival of the 7th Illinois Mounted Infantry saved us and captured a company of the Augusta Arsenal Battalion. I found this wire working all right, but our troops destroyed the wire in the direction of Savannah and spoiled a good thing. During our stay in Savannah with the assistance of Lieutenant Kelly, of the Navy, I relaid a cable from Beulah to Rosedew Island, and in connection with Lieutenant Allen, of the Signal Corps, we kept open communication with General Hazen who was dismantling Fort McAlister on the west bank of the Ogeechee River. During the storming of Fort McAlister Generals Sherman and Howard were on top of the rice mill at Chevis Point using the Signal Corps with General Hazen who was making the attack on the fort. General Sherman made the remark that 'the signal and telegraph corps ought to be blended together to make them more effective,' and was loud in his praise of what they had already accomplished.

"I also tapped the rebel wire at Midway, S. C. I found Charles Eddy, our chief operator, at General Sherman's headquarters on the same mission about four miles west of me. Our troops as usual destroyed the wire as soon as they came to it, although I thought I could reach the wire several hours before even our enterprising 'bummers' could do so by taking an early start with our escort, but the bummers followed closely in our wake. We were not sorry, however, as we needed their assistance before we reached the railroad. The rebel cavalry gave us several lively fights and the bummers helped us out. During the Savannah and Goldsboro, N. C., campaigns, I performed aide duty for General Howard and was frequently called on for such service, and was more or less under fire, especially at Rivers Bridges, Orangeburg, Columbia, Cheraw, Fayetteville and Bentonville. During this march I prepared by order of General Howard a number of communications in cipher and sent them by scouts to the fleet. Each scout was to receive $100 in gold on the safe delivery of the messages to any officer of the fleet.

"In October, 1866, I was at the request of General Thomas, appointed cipher operator, for the military district of Tennessee, at Nashville, and continued as such to June 30, 1869. During the troublesome municipal affairs in Nashville, in 1867, I rendered good service to General Thomas in concentrating troops at that point, and General Thomas in a letter from his headquarters in Louisville thanked me for the care and order in which I preserved his communications to Washington and to the different commands scattered through Tennesee and Alabama. I also furnished General Thomas later, while he was in command on the Pacific Coast, missing copies of his communications to Washington, retranslating them from copies on file in my possession at that time. His letter acknowledging the receipt of the same was burned in the fire that destroyed other interesting data. Although the letter from General Thomas was directed to me, it was in tone addressed to the whole United States military telegrahp operators.

"As near as I can remember the letter from General Thomas read as follows: 'Accept my thanks for the promptness with which you complied with my request. I feel deeply indebted to the telegraph operators of my late department for the efficient service they rendered me in the campaigns we passed through.'"

(To be Continued.)

Railroad Organization Elects Officers.

The Order of Railroad Telegraphers, Despatchers, Agents and Signalmen, which lately held its convention at Pittsburg, Pa., elected the following board of officers: President, J. D. S. Baird, Philadelphia; grand secretary-editor, J. R. T. Auston, Philadelphia; grand treasurer, James A. Quinn, Philadelphia; first vice-president, George O. Eppenheimer, Frankford, Pa.; second vice-president, C. F. Fortney, Williamsport, Pa.; third vice-president, H. T. Biddle, Elkton, Md.; fourth vice-president, W. J. McCurtan, Olean, N. Y.; fifth vice-president, J. H. Hayes, Elmira, N. Y.; sixth vice-president, Frank L. Thompson, Lakota, Minn.; directors, R. H. Conway, P. D. Sell, S. W. Hiller, R. J. Hunter, G. Pancoast, Amos Strickland.

St. Louis was designated as the point for holding the next meeting, at a date to be hereafter named.

Mr. Collins and Telegraph Age.

Mr. E. W. Collins, superintendent of the Postal Telegraph-Cable Company, at Cleveland, O., writes to this journal as follows:

"I take pleasure in handing you herewith my check for $1.50 to cover a year's renewal of my subscription to Telegraph Age, to which periodical I have been a continuous subscriber for a quarter of a century, with pleasure and profit to myself. While waddling about in its swaddling clothes in the early days the Age received many a bump, but it got 'through trials to glory,' just as I hope you and I will by and by. More power to it!"

Mr. J. M. Maddox, manager of the American District Telegraph Company, San Francisco, Cal., in ordering a renewal of his subscription, recently, wrote: "It has always been a pleasure for me to say a good word for Telegraph Age; it is a habit I have no desire to discontinue, believing that the columns of the paper provide educational features which, if taken advantage of, not losing sight of the fact that proper effort be made in other directions, that chances for advancement or promotion, would be materially increased."

Scorn not the advice of an inferior; the underling of fortune may be, in merit, your superior Situation never determines ability.

Simultaneous Telephony and Telegraphy.

BY FRANCIS R. HOYT, IN "TELEPHONY."

The repeating coil simplex adapts itself more readily to small plants where the volume of telegraph business is not great enough to demand more than one telegraph message per pair of telephone wires. In cases of greater demand some other form of telegraph circuit must be used, arranged so that a simplex, composite, or if necessary, a polar duplex can be immediately set up and put into practical operation without any change in the ringing circuits of the switchboards. That is, there must be a conformity not only of apparatus, handling, etc., but conformity of operation. As this operation means practically the ringing by operators over these lines, every line should itself control the ringing current it is to furnish at the distant end, and should do so without the operator's knowledge. From this we can see that in cases of composite and polar circuits where high frequency ringing current must be used, the simplex circuit to be used in conjunction with these should also use high frequency current not only in order to keep the test panel as near uniform as possible, but because the cost of installation is no higher, the ringing can be done at a much greater distance, and the efficiency is, if anything, slightly improved. A repeating coil to be of practical use in simultaneous work must adapt itself readily to both ringing and talking; and as any transformed energy must undergo a transformation loss, it is plain that when the repeating coil is taken out of the talking circuit the transmission will be improved. This must not be taken to mean that it is not possible to ring through a repeating coil of this kind with high frequency current; the fact is that using high frequency current on a repeating coil simplex will improve its ringing capacities.

The only objection that can be offered to simplex circuits using the retardation coil is that it cannot be used without a composite ringer, or, in other words, without a high frequency current for ringing; but as this circuit was designed for use in connection with composites, polars, etc., this is immaterial.

The retardation coil used in this circuit has 1,000 ohms resistance and a very high coefficient of self-induction, so that the rapidly vibrating voice currents traveling over the metallic line circuit pass through the condensers and into the switchboard and vice versa, without attempting to thread the retardation coil. A current of very high frequency will always take a path of ohmic resistance in preference to a path of self-induction. Probably the most confusing terms used by the practical telephone man are self-induction and impedance. In simultaneous work especially these terms should be clear to all who have occasion to use them; but unfortunately, like all other theoretical phrases and branches of our business, these terms have been shrouded with mystery, and seem to be beyond the comprehension of the practical electrician. In reality they are very simple, and in this case the whole confusion has been caused by the name given the coil (impedance) which is representing a self-induction unit and not a unit of impedance. For, to be absolutely correct, impedance means, "any opposition to current flow," the theoretical definition of which is, "a quantity expressed in ohms equal to the square root of the sum of the squares of the inductive resistance of the circuit and the ohmic resistance;" or, to use plain terms, it is the sum of the ohmic resistance and the spurious resistance of a circuit expressed in ohms. From this it can be seen that if we had a circuit in which there was condenser, a non-inductive resistance, an inductive resistance and any other resistance offering devices, we could calculate the ohmic resistances of them all, add them and say the impedance of the circuit was of certain amount, expressed in ohms. If alternating current was applied to this circuit (the terms self-induction and impedance never being used except where an alternating or an interrupted direct current is concerned) we would find that there was more retarding effect in the inductive coil alone than in all of the other branches together, which goes to show that the impedance effect is nothing more than the ohmic resistance of the circuit, while the real opposition is in the self-induction of the so-called impedance coil. Self-induction means, the induction of a circuit or coil on itself and should always be expressed in henrys (the unit of self-induction). A peculiarity of the impedance coil is that the opposing power is instantaneous; that is, it is at its full value at the same moment that the impressed current is started or stopped.

So then when it is said that the high frequency voice currents will take the path of the greatest ohmic resistance in preference to a path of any self-induction, it is meant that the voice currents will take the path of the line, condensers, etc., instead of trying to enter the retardation coil. While this coil has a very high resistance, in most cases it is very small as compared with the resistance of the line.

The resistance of a condenser to an altering current of any known period can be calculated by a very complex formula which it is not necessary to consider here, but it might be added that an ordinary two microfarad condenser with a ringing machine offers a resistance of close to 500 ohms and a standard one-microfarad condenser in the same circuit would be about 1,000 ohms. As the resistance of a condenser decreases as the frequency increases, it follows that this same condenser in a talking circuit would offer resistance so very low that it would not prove detrimental to the transmission.

From these explanations of the fundamental principles we can understand just how it is possible for telegraph impulses to be sent over wires carrying a telephone message, and all the elaborate systems are based on these simple foundations.

* * * * * *

The following are a few notes well to remember:

An interrupter for high frequency should give at least 300 pulsations per second.

The operating current of a standard 150-ohm Morse relay is four one-hundredths of an ampere.

Telegraph potential should be five one-hundredths of an ampere at each end of the line.

A standard Morse relay with the armature in contact with the cores has a self-induction of about eight henries.

Increasing the number of composite sets in series decrease the speed of signaling.

A short method of figuring the number of gravity cells necessary (when they are used) on telegraph lines, to give the proper operating current for the relays, is to simply divide the total resistance by twenty-three. The result obtained is the number of cells necessary.

For the number of cells necessary to operate four-ohm sounders, divide the total resistance by two.

The electromotive force of a gravity battery is one and seven hundredth volts; the internal resistance two ohms.

Fessenden's Interference Preventer for Wireless Telegraphy.

Several accounts of tests made with the Fessenden system by the United States Navy representatives have referred to the remarkable immunity secured in working at the same time as other stations close by and with wave-lengths not very different, by the employment of the inventor's so-called "interference preventer," says an English contemporary. Since, however, no details have been published as to the mode of action of this device, there has existed, besides some curiosity as to the means employed, also no little scepticism.

The patent specifications have now been published, and so the principle employed can be described, although there are probably a number of details to which attention has to be paid for successful results to be obtained in practice.

The method is stated to be based upon the fact that resonance curves in general have a curvature of the same sign. Hence, if three circuits having very small damping are carefully tuned, the one circuit to the frequency which it is desired to receive and the other two circuits to a higher and lower frequency, respectively, the two latter circuits can be made to neutralize the effect of disturbing impulses; that is, those not of the desired frequency, caught by the properly tuned aerial and which otherwise would be heard in the receiving instrument.

Though in practice a single vertical antenna is employed, connected to three separate tuned circuits, it is preferred to describe the arrangements as applied to the case where three separate antennae are used to arrive at the same result. Here the three receiving antennae which we will call A_1, A, A_2 are tuned, A to the frequency at which it is desired to receive, A_1 to a somewhat higher and A_2 to a somewhat lower frequency. Each aerial circuit contains a detector, which is preferably a solid barretter, and the necessary cell and potentiometer arrangement. The receiving or, rather, indicating instrument is a telephone having four coils, two on each limb of the magnet. Calling these coils C_1, C, C, C_2 to correspond with respective aerial circuits it is arranged that one pair, CC, is in circuit with the correctly tuned antennae A, and one each of the other coils, namely, C_1, C_2, with antennae A_1, A_2 respectively. These two latter coils are arranged so that their windings oppose the action of those of the coils CC, and they are made somewhat weaker than these coils (fewer turn). It will be seen that on a disturbing impulse striking all three antennae this will, if not in tune, produce nearly equal effects in the barretters, and hence these effects will neutralize each other as regards their effect on the diaphragm of the telephone. If, however, the oscillations are of the proper frequency, the barretter in the antenna circuit A will be very much more strongly affected than either of the others, and the telephone diaphragm will be actuated.

This effect can be enhanced by making the damping of the circuits A_1 A_2 somewhat greater than that on circuit A. Still further security against disturbances can, if desired, be obtained by having recourse to mechanical means depending upon the use of group frequencies; several arrangements by Professor Fessenden with this aim in view are already well known.

The adjustment of the relative strength of the coils is, of course, the most important point, and as regards this it is stated that the balancing can be effected by calculation or trial, or by a combination of both.

The arrangement is thus, on the whole, very simple, while the test results have shown that it is effective. It will doubtless be argued in this country that an unnecessary complication has to be added to the existing wireless equipment. But Professor Fessenden—who can scarcely be considered as a disbeliever in the future of wireless telegraphy—states, with some directness, that mere tuning to the wave-frequency, however careful such tuning may be, does not sufficiently ensure against interruption from disturbing sources, and especially where the number of closely adjacent stations is considerable.

It appears from this that it is the more severe working conditions prevalent in America which have necessitated the development of a self-protective system such as we have scarcely found necessary as yet in this country, where the stations are but little closer now than in the days when it was admitted that interference could not be prevented. In any case, since the British Isles are not very large there will probably come a time, if the use of wireless telegraphy continues to advance at its present rate, when some special device for preventing interference from neighboring stations cannot well be dispensed with.

Reminiscences of the Reporters' Gallery at Washington.

Within the once familiar precincts of the press gallery of the House of Representatives I felt as Rip Van Winkle must have felt—only more so, for Rip slept but twenty years, and it is nearly forty since I was one of the "boys" who from their perch above the Speaker's chair kept tabs on what Congress was doing. To work in another simile, I was like a cat in a strange garret, for there was not one familiar face or object, and the furniture and fittings were palatial compared with the bare room back of the gallery in which the old-timers used to congregate when nothing was doing in the House. I gained admission to these sacred precincts by presenting my card, with the statement that I was a member of the first committee in charge of the gallery, and this proved an open sesame. When James G. Blaine was elected Speaker of the House in 1869, he sent for George W. Adams, the correspondent of the New York World, and said to him that if the correspondents would appoint a committee to take charge of the press gallery (it was called the reporters' gallery then) he would turn its control, vested in him, over to them, and they could make such regulations regarding admissions, etc., as they saw fit. The correspondents met and elected as such committee George W. Adams, General H. V. Boynton and Charles A. Pilsbury, and the latter is to-day the only survivor. Of the fifty or sixty correspondents then eligible to the privileges of the gallery only two are now on the roll —William B. Shaw, of the Philadelphia Enquirer, and W. C. McBride, of the Cincinnati Enquirer. Mr. Shaw even then was known as the "Nestor of the Row" (Newspaper Row on 14th street, now a thing of the past) and is said to be practically on the retired list, but McBride, a younger man, is still the active head of the Cincinnati Enquirer's Washington bureau.

The reporters' gallery of the early days—the old name comes most readily—was smaller than it is to-day and the room back of it contained only a bare table and some chairs. There was a large mirror in a gilt frame, before which the occasional lady correspondents used to prink and the "boys" adjust their neckties, but otherwise the walls and the tiled floor were bare. In the corridor adjoining was the Western Union telegraph, where to-day may be seen, as in the early days, "Ham" Young, one of the most popular operators Washington has ever known, and who is still alert and vigorous. Fred Royce, Morell Marean, and many other operators well known to newspaper men of the late '60's and the early '70's, have all passed away.

The gallery for a number of years past has been in charge of Charles H. Mann—Charley Mann the boys call him—and the changes made during his administration have been many and important. Practically the whole corridor is used now. There are two long tables instead of one, and they are supplied with stationary, ink, pens, scissors, mucilage, directories and other books of reference. Upholstered seats have been placed in the window recesses, the floor is carpeted, and the walls hung with portraits of newspaper proprietors. I should much rather have seen portraits of the men whose work was done in this gallery. Opening from this room is a smaller room containing a lounge and easy chairs, and the Western Union has its operators as usual in the corridor outside. Near at hand is another room for the use of the correspondents, in which ten typewriters—the machines, not operators—are at the correspondents' disposal. In the old days correspondents had to provide their own stationery, carrying it with them or keeping a supply in their desks in the reporters' gallery. The telephone was not known then, and the typewriter had not come into general use. To ascertain what was going on in the Senate involved quite a walk from the House side, including the descent of one stairway and the ascent of another, and to communicate with the office on 14th street called for a walk or a car ride of nearly a mile. Now the telephone puts you in touch with everybody, everywhere, and the typewriter copy is a boon to compositors and telegraph operators. "Charley" Mann pleads guilty to being a Democrat, which is natural enough as he comes from the Democratic city of Baltimore, but he has the whole corps of correspondents back of him, and the only attempt made to displace him ended in signal failure. He is a cyclopedia, a gazateer, a directory, and a good fellow, and is likely to hold his job for life.

Forty years ago those entitled to admission to the gallery numbered about fifty, and to-day there are about 180. While I cannot speak advisedly on this point, I am inclined to think that the incomes of the lesser number aggregated as much as those of the greater number now. It was easy to make $100 to $150 a week. Most of the large dailies paid at least $10 a column, and some of them twice that. The Chicago Tribune paid George Alfred Townsend $20,000 for one thousand columns to be contributed within three years at the rate of three hundred columns a year. It was customary when a correspondent went away for a long or short outing to turn over his whole salary to the man who did the work during his absence; and in the summer time, O. K. Harris, who was associated with Frank A. Richardson in reporting the proceedings of Congress for the Baltimore newspapers, derived a princely income from this source. For some time the leading dailies paid William B. Shaw a weekly salary for getting committee news, and I am not sure but that included the proceedings of the executive sessions of the Senate. The story is told that at a dinner party after one of these executive sessions a Senator said: "Well, Shaw, what was done in executive session to-day?" Shaw shook his head and replied: "I can't tell you, you Senators are too leaky." It was not very difficult, however, to get at what was done

in executive sessions, despite the precautions taken by the Senate to preserve secrecy. Some Senators felt, no doubt, that the public had a right to this information; and I have one Senator in mind who was notoriously "leaky," but I believe unconsciously so; and on one occasion he began to discuss the executive proceedings in open Senate and was shut off by a colleague. A chapter might be written on this phase of Congressional reporting.

It does not seem as though The Associated Press of those days was as strong a competitor of the "specials" as it may be to-day. "Father" Gobright, its head, was very conservative and the matter he sent out was mainly of a routine order, and it was generally known to the specials what was going over the wires to The Associated Press so that they need not duplicate. Under President Johnson, W. W. Worden, then the Washington correspondent of the Baltimore Sun, had a practical monopoly of the White House news and dealt it out as he saw fit. Now the news appears to be bulletined largely, so that "beats" must be more difficult than formerly, and most of the departments and bureaus send out typewritten matter to newspapers all over the country—such matter as used to make "stories" that were profitable to the special correspondents.

Perhaps I should not have been surprised at finding so many young men in the press gallery. Come to think of it I was once young myself. One to whom I was introduced was born the year I came to Washington, and the majority were not born when I began writing for the press fifty-one years ago. I often think that had I remained at the National Capital I should, like all save one or two of my associates, have long since joined the silent majority.

In looking down upon the House in session there was not in evidence a single familiar face outside of the Maine delegation. Think of the men who have gone. I shall not attempt to name them in chronological order or to give a complete list, but simply mention those who happen to come to mind. Naturally, James G. Blaine comes first, not only because in ability he ranked above his contemporaries but because he was the best friend the newspaper men in Washington had in my day. He had been a newspaper man himself, and a good one, and was always helpful in imparting information, in suggestions and in words of encouragement. Then—always a conspicuous figure—there was Ben Butler with his unlighted cigar; General Banks, whose hair was observed to change gradually from coal black to snow white, when he gave up the use of dye; Alexander H. Stephens of Georgia in his wheel chair, frail in body—in fact, a living skeleton—but whose coal black eyes blazed like fire when he was aroused; "Sunset" Cox, everybody's friend, with newspaper men a specialty; Mungen of Ohio, whose speech on Senator Sumner was expunged from the record; Proctor Knott, whose famous Duluth speech and his no less witty speech on the District of Columbia appropriation bill I had the pleasure of hearing; Dan Voorhees, the "Tall Sycamore of the Wabash," later a member of the Senate; Sam Randall, a Democrat who represented a Republican district, and who led the memorable fillibuster on the force bill, when the House was in continuous session for some forty-eight hours; gallant Phil. Cook of Georgia, an ex-Confederate who bore many severe wounds, and who at the time of the Hayes-Tilden contest, when there was much talk of a resort to arms, said if the northern Democrats wanted to fight they could do so, but he had had all the fighting he wanted; "Pig Iron" Kelley, the high priest of protection; little Dickey, Thad. Stevens' successor, who only rose in the House to say "I object;" James Brooks, editor of the New York Evening Express, a native of Maine, whose last years were clouded by the Credit Mobilier scandal; John Morrissey, ex-pugilist, whose gambling house on E street near 14th was much frequented by the statesmen of that day. But it is time to call a halt. To name all the dead and gone statesmen who held the boards from '69 to '79 would outrun the space at the disposal of a country editor, who must have regard for the local news of his vicinity.—C. A. Pilsbury in The Republican Journal, Belfast, Me.

True Courtesy Pays.

The Delaware, Lackawanna and Western Railroad is noted for the excellence of its train service, its fine suburban service being especially commendable. The desire to serve the public acceptably is doubtless fostered by the spirit that formulated and issued a circular such as the following for the guidance of employes:

The principle that underlies courteous treatment of others is simply that of doing unto others as you would they should do unto you.

In a highly complex and technical business such as that of the railroad, there are many things that you, with your training and daily experience, understand with perfect familiarity, but which the public do not understand; therefore, do not assume that the public should comprehend them without asking questions, but when they make inquiry of you give them the courtesy of a reply just as full and clear as you can make it, without any suggestion of superiority born of a greater knowledge.

Words are only one means of expression, and manner is quite as important; therefore remember that a kindly and gracious manner is not only the sign and mark of a self-respecting man, but is to your words what oil is to machinery in making them move effectively to their purpose.

True courtesy is no respector of persons. It gives the civil word and the helping hand quite as readily to the ill-clad stranger as to an official of the company.

Courtesy is not only something the public have a right to expect of you, but it pays. It pays in the friends it makes you personally and as a representative of the company. It pays in minimizing the friction of your life, as well as that between the company and its patrons. It pays in raising your standing with the company.

It is the wish of the management of this company that all its representatives, whose work brings them into contact with the public, may appreciate and fully measure up to their duty and privilege in this respect.

THE RAILWAY TELEGRAPH SUPERINTENDENTS MEET IN CONVENTION.

When an association which has the telegraph for its basis of organization, an interest which also serves as the bond holding it in continuous fellowship, has so far passed its twenty-fifth anniversary as to be well advanced toward that of its thirtieth, it may well be said that it is getting on in years. If multiplicity of years afford any indication of wisdom, of dignity and of respectability, then the Association of Railway Telegraph Superintendents is all of these, especially when, as if "by their fruits ye shall know them," the record is one of

EDWARD P. GRIFFITH, OF NEW YORK.
President of the Association of Railway Telegraph Superintendents.

growth, of expansion and well doing. When train despatching by telegraph came into existence, then the germ of the railway telegraph superintendent made its appearance. The present association is the outgrowth of a need that has found expression, development and promotion in answering to the demands of the service. How well the superintendents have met the exigencies of the situation, the demands placed upon them is a matter of record.

The railroad telegraph service has produced some of the brightest men in railroad economy. The tendency has been, by virtue of the dignity of the calling itself, to instruct and elevate the individual, so that in every grade of the service, reaching up to the highest executive heads of many of our most important systems of railway, the successful telegrapher is to be found. It is a fine exhibit he has made, alike of mentality and executive force, and nothing that may be said can add to the strength of the thought and lesson to be derived therefrom than is expressed in the statement of the simple fact itself. The responsibilities attaching to this important office in railroad operating are many. To meet these demands the services of men of intelligent minds and progressive ideas are required—men who are quick to discern not only the needs of to-day but the necessities of to-morrow. By reason of the consolidation of interests and merger of lesser systems of railroads into vast and far-reaching extensions, the office of superintendent of telegraph is becoming correspondingly enlarged. Never before in the history of railroading has the accountability of the superintendent been so great as now. Hence it is that the importance of the annual convention regarded as an educational factor, has steadily advanced from year to year. The papers that are read at these conferences, and the wide range of discussions that has followed weighty presentations, abundantly testify to this fact. The good this association has wrought is too obvious to require enumeration. When such manifest benefits are to be secured it is to be regretted that the association does not number within its membership accredited representatives from every railroad system in this country. It is a question, indeed, whether any railroad can afford properly to hold aloof from the assistance such an association offers. Especially is this true at this time, when so much that is new in practice is coming up for consideration, and acceptance.

National and state legislation, of a character designed ostensibly to regulate, lessen and, no doubt, make easier, the working hours of railroad telegraph operators, has nevertheless, because of superficial knowledge of governing conditions in the legislative mind, shot wide of its mark, for it has been the means rather of befogging the situa-

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

tion so far as conferring benefits on the individual is concerned. What it has accomplished, however, is to hasten the time when the telephone shall virtually supersede the telegraph in train despatching The movement in this direction is becoming general and the change from one system to another, wherever adopted, has worked results that thus far have more than realized expectations, meeting

with hearty approval. From a means employed first as auxiliary to that of the telegraph, it would appear now that, having passed the experimental stage, the telephone was to advance to first place and become installed as the fundamental method of train operating. So radical a change from former conditions introduces a question of the highest practical import in railroad operating, and it is natural therefore that the matter should receive much attention from the superintendents at the convention now at hand. The published news in our railroad columns of late bear evidence of the changes in thought and fact that have occurred respecting train despatching methods. The record is one of interest and indicative of future and wide-expanding achievement in this particular field.

As an evidence of the increasing value of the annual conventions of the Association of Railway Telegraph Superintendents, the meeting this year, which occurs at Montreal, Que., will cover a period of four days, instead of the usual three, the dates being Wednesday, Thursday, Friday and Saturday, June 24, 25, 26 and 27. It will be the twenty-seventh of the series, and the second time since the formation of the organization, which oc-

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

curred at Chicago, November 22, 1882, that Montreal has been selected, the first date being June 12, 1895, thirteen years ago. Headquarters will be established at the Windsor Hotel. This famous hostelery is conducted on the European plan. The following schedule of prices has been adopted: Single room, without bath, $2; with bath, $2.50; two occupying a room, without bath, $3; with bath, $4. Meals, a la carte. No charge will be made for exhibits, if located in the rooms of the exhibitors.

Intending exhibitors of apparatus of whatever nature are advised that by authority of the Canadian collector of customs all such exhibits will have to be covered by regular invoices and entry passed in the usual manner, but the duty, if collected, will be refunded on the apparatus being returned to the United States. All those bringing in such apparatus should provide themselves with invoices in triplicate, and also, before leaving the United States, should make a declaration to the United States customs that the instruments are to be returned there, in order that they will not have to pay duty to the United States customs on re-entry. Duty will have to be paid on any souvenirs intended for distribution at the convention.

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

The Pullman Company makes the following announcements to the superintendents: "We will take pleasure in extending to delegates and dependent members and their families the same courtesies as heretofore, namely, delegates to pay full fare en route to Montreal, and on presenting 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. W. A. Ritchie, district superintendent, Montreal, passes will be issued for the return trip."

While the business that calls the superintendents together at Montreal, to which city the Mayor will deliver an address of welcome, will absorb a very large share of their allotted time, an attractive programme for their social entertainment and that of the ladies and other guests of the party, has been arranged. This has been done under the supervision of W. J. Camp, vice-president of the association, and electrical engineer of the Canadian Pacific Railway Company's Telegraph, and W. W. Ashald, superintendent of telegraph of the Grand Trunk Railway system. Both of these gentlemen, who reside in Montreal, have been indefatigable in their efforts to extend an engaging hospitality to their visiting associates. The plan in brief outline will include a trolley ride about the city of Montreal; then the Canadian Pacific Railway has courteously offered to provide transportation for an excursion from Montreal to Quebec and return. Besides this the Richelieu and Ontario Navigation Company has agreed to furnish transportation at half rate over any part of their system which the superintendents may desire to travel, either from Toronto or Kingston to Montreal, or for side trips to Quebec or up the celebrated Saguenay River. Prices have been fixed as follows: Toronto to Montreal, $5; Kingston to Montreal, $2.75; Montreal to Quebec, $2.25 one way, return $4.25; Quebec to the Saguenay and return, $4.50. Meals and berths will be extra: dinner, one dollar; breakfast and supper, seventy-five cents each; berths in outside rooms, one dollar per night. In order to obtain advantage of these rates members will be required to show certificates of membership when purchasing their tickets.

An excursion will be made by the Grand Trunk

(Continued on page 414.)

WALLACE W. RYDER.
Superintendent of Telegraph, Chicago, Burlington and Quincy Railroad, Chicago, Ill.

N. E. SMITH.
Superintendent of Telegraph, New York, New Haven and Hartford Railroad, New Haven, Conn.

J. S. STEVENS.
Superintendent of Telegraph, Chesapeake and Ohio Railway, Richmond, Va.

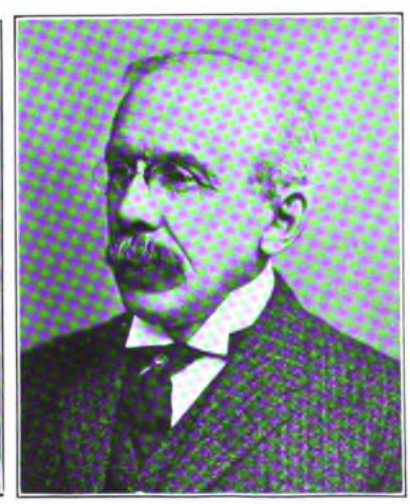
W. P. CLINE.
Superintendent of Telegraph, Atlantic Coast Line Railroad, Wilmington, N. C.

C. P. ADAMS.
Superintendent of Telegraph, Southern Railway, Washington, D. C.

JOHN L. DAVIS.
Superintendent of Telegraph, Chicago and Eastern Illinois Railroad, Chicago, Ill.

ISAAC T. DYER.
Superintendent of Telegraph, San Pedro, Los Angeles, and Salt Lake Railroad, Los Angeles, Calif.

F. L. BLENDINGER.
Assistant to First Vice-President and Superintendent of Telegraph, Lehigh Valley Railroad, New York.



M. MAGIFF.
Superintendent of Telegraph, Central Vermont Railway, St. Albans, Vt.

GEORGE C. KINSMAN.
Superintendent of Telegraph, Wabash Railroad, Decatur, Ill.

E. E. TORREY.
Superintendent of Telegraph, Mobile and Ohio Railroad, Jackson, Tenn.

CHARLES SELDEN.
Superintendent of Telegraph, Baltimore and Ohio Railroad, Baltimore, Md.

OSCAR C. GREENE.
Superintendent of Telegraph, Northern Pacific Railway, St. Paul, Minn.

A. B. TAYLOR.
Superintendent of Telegraph, New York Central and Hudson River Railroad, New York.

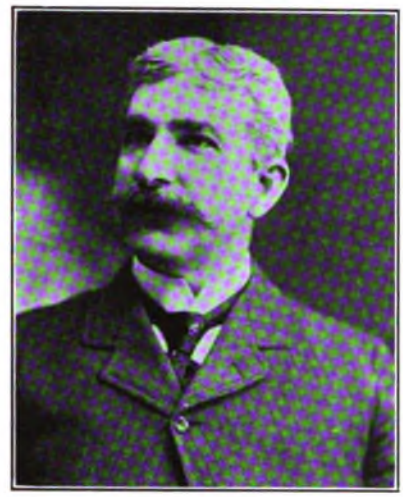
FRANK H. VAN ETTEN.
Superintendent of Telegraph, Southern Indiana and Illinois Southern Railway, Chicago, Ill.

CHARLES M. LEWIS.
Superintendent of Telegraph, Philadelphia and Reading Railway, Reading, Pa.

S. L. VAN AKIN, JR.
Assistant Superintendent of Telegraph, New York Central and Hudson River Railroad, Syracuse, N. Y.

L. S. WELLS.
Electrical Superintendent, Long Island Railroad, New York.

EDWARD A. CHENERY.
Superintendent of Telegraph, Missouri Pacific Railway, St. Louis, Mo.



W. F. WILLIAMS.
Superintendent of Telegraph, Seaboard Air Line Railway, Portsmouth, Va.

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

EDGAR A. KLIPPEL.
Superintendent of Telegraph, Oregon Railroad and Navigation Company, Portland, Ore.

FREDERICK E. BENTLEY.
Superintendent of Telegraph and Telephones, Terminal Railroad Association, St. Louis, Mo.

JOHN M. WALKER.
Superintendent of Telegraph, Denver and Rio Grande Railroad, Denver, Col.

WM. W. ASHALD.
Superintendent of Telegraph, Grand Trunk Railway System, Montreal, Que.

VICTOR T. KISSINGER.
Assistant Superintendent of Telegraph, Chicago, Burlington and Quincy Railroad, Lincoln, Neb.

R. L. LOGAN.
Superintendent of Telegraph, Kansas City Southern Railway, Kansas City, Mo.

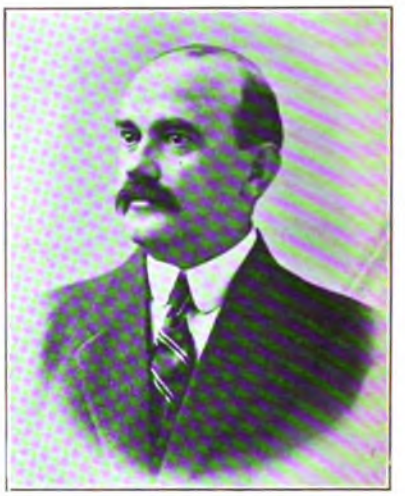
J. L. HENRITZY.
uperintendent of Telegraph, Colorado and Southern Railway, Denver, Col.

G. H. GROCE.
Superintendent of Telegraph and Signals, Illinois Central Railroad, Chicago, Ill.

C. A. PARKER.
Superintendent of Telegraph, Denver, Northwestern and Pacific Railway, Denver, Col.

GEORGE A. CELLAR.
uperintendent of Telegraph, Pennsylvania Lines West of Pittsburg, Pittsburg, Pa.

B. F. FROBES.
Superintendent of Telegraph, Oregon Short Line Railroad, Salt Lake City, Utah.



W. C. WALSTRUM.
Superintendent of Telegraph, Norfolk and Western Railway, Roanoke, Va.

U. J. FRY.
Superintendent of Telegraph, Chicago, Milwaukee and St. Paul Railway, Milwaukee, Wis.

L. B. FOLEY.
Superintendent of Telegraph, Delaware, Lackawanna and Western Railroad, New York.

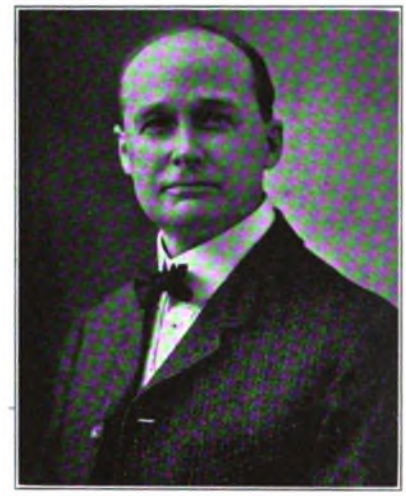
C. H. GAUNT.
Assistant General Manager and Superintendent of Telegraph, Atchison, Topeka and Santa Fe Railway, Topeka, Kans.

S. A. D. FORRISTALL.
Superintendent of Telegraph, Boston and Maine Railroad, Boston, Mass.

H. C. HOPE.
Superintendent of Telegraph and Signals, Chicago, St. Paul, Minneapolis and Omaha Railway, St. Paul, Minn.

S. K. BULLARD.
Superintendent of Telegraph, Missouri, Kansas and Texas Railway, Sedalia, Mo.

JOHN B. SHELDON.
Superintendent of Telegraph, Union Pacific Railroad, Omaha, Neb.



F. G. SHERMAN.
Superintendent of Telegraph, Central Railroad of New Jersey, New York.

C. S. RHOADS.
Superintendent of Telegraph, Cleveland, Cincinnati, Chicago and St. Louis Railway, Indianapolis, Ind.

A. E. ROOME.
Superintendent of Telegraph, Southern Pacific Company, San Francisco, Cal.

(Continued from page 408.)

Railway on Wednesday afternoon, June 24, which will convey the visitors from Montreal to Lachine, where they will board a steamer and shoot the Lachine Rapids. Besides this a special electric train will be placed at the disposal of the association for a trip from Quebec to St. Anne de Beaupre (a celebrated shrine), and which, on its return, will stop at the beautiful Montmorency Falls.

A visit to Quebec, planned for Friday night, June 26, will hold especial attractions for many, inasmuch as that quaint and historic old city presents so much that is of interest in its ancient style of architecture, dating back to a by-gone age, French in its individuality, so utterly different from anything of that nature to be met with elsewhere on this continent. The Chateau Frontenac affords the best accommodations to travelers.

From all that has been indicated it will be observed that there is evidence in abundance that the leisure hours of the railroaders and their friends will be abundantly provided for during their Montreal visit, and it is safe to say that time will not hang heavily on their hands.

The committee of arrangements, which has control of all matters pertaining to the entertainment of the visiting superintendents, is composed of the following: W. J. Camp, electrical engineer, Canadian Pacific Railway Company's Telegraph, Montreal, chairman; W. W. Ashald, superintendent of telegraph, Grand Trunk Railway, Montreal; E. H. Millington, superintendent of telegraph, Michigan Central Railway, Detroit; G. C. Kinsman, superintendent of telegraph, Wabash Railway, Decatur, Ill.; M. Magiff, superintendent of telegraph, Central Vermont Railway, St. Albans, Vt.; S. A. D. Forristall, superintendent of telegraph, Boston and Maine Railway, Boston, and N. E. Smith, superintendent of telegraph, New York, New Haven and Hartford Railway, New Haven, Conn.

The ladies' committee, which is now arranging for the reception and special entertainment of the ladies of the visiting party, is made up as follows: Mrs. W. J. Camp, chairman; Mrs. James Kent, Mrs. W. W. Ashald, Mrs. M. Magiff, Mrs. J. F. Richardson, Miss Amy Jennings, Mrs. Thomas Rodger and Miss Gladys Camp.

The papers to be read at the convention embrace the following:

"Dry Batteries on Telegraph Circuits," by U. J. Fry, of Milwaukee; "Reduction of Telegraphing by Use of Printed Forms," by O. C. Greene, of St. Paul; "Commercial Reports," by G. C. Kinsman, of Decatur, Ill.; "Wiring of Station Buildings from the Contractor's Standpoint," by J. H. Jacoby; "Adverse Railroad Legislation," by E. A. Chenery, of St. Louis; "My Experiences While in Charge of Telegraph Work on the Isthmus," by C. F. Annett, of Goldfield, Nev.; "Qualifying Operators for Train Despatching," by C. S. Rhoads, of Indianapolis; "Selecting Operators for Railroad Use," by L. H. Korty, of Omaha; "Moving Trains by Visible Signals," by L. B. Foley, of New York; "Block Signals," by H. C. Hope, of St. Paul; "Use of Telephones in Connection with Train Movements," by W. W. Ryder, of Chicago; "The Interstate Commerce Commission," by Charles Selden, of Baltimore; "Past, Present and Future of the Association of Railway Telegraph Superintendents," by W. F. Williams, of Portsmouth, Va.; "The Telephone," by F. F. Fowle, of Chicago; William Maver, Jr., of New York, will, it is expected, read a paper on a topic yet to be announced.

Officers will be chosen at the Montreal meeting to succeed E. P. Griffith, superintendent of telegraph, of the Erie Railroad, New York, president; William J. Camp, electrical engineer of the Canadian Pacific Railway Company's Telegraph, Montreal, Que., vice-president, and P. W. Drew, superintendent of telegraph of the Wisconsin Central Railway, Chicago, secretary.

SOMETHING ABOUT MONTREAL.

To an American who never has visited Montreal, a statement of the size and importance of that commercial port, the chief in Canada, together with a reference to its architectural attractions and of its beauty of location and environment, will be likely to arouse pleasant surprise on the part of the uninformed, to invest the old town with especial interest and stimulate a desire to view such a great and inviting center, now containing a population approximating 350,000.

There are many points of difference of course between this fair Canadian metropolis and a city of the United States, but the bustle and activity incident to the one is observable in the other. With all their points of dissimilarity both are intensely American in the broad acceptance of that term.

Situated at the head of ocean navigation, distant nearly one thousand (986) miles from the sea, on an island about thirty miles in length and some seven miles wide, lying at the confluence of the St. Lawrence and Ottawa rivers, Montreal presents a beautiful appearance as it rises terrace on terrace, surmounted by Mount Royal Park, an enclosure of over four hundred acres, at the commanding altitude of seven hundred feet above the water. As may be imagined, the view from this height is extensive and magnificent, reaching far up and down the broad St. Lawrence, and its noble tributary, the Ottawa. It is a view that the excursionists of the convential party will enjoy and long remember.

Montreal is an old city. The site upon which it is built was first visited by the white man in 1535, when the French explorers under Jaques Cartier, landed on the island. The founding of the place, however, occurred over a century later, in 1642, so that Montreal ranks, after the early Spanish occupations in Mexico, as one of the oldest settlements on this continent. While there is much about Montreal that distinguishes the modern town, with its splendid streets and massive buildings, there is also much to be ob-

served that is quaint and old, reminiscent of other days and of another race. One thing that impresses Americans in the architectural features of the city are the numerous churches, particularly those of the Roman Catholic denomination, for it must be remembered that the French element, who profess that faith, constitute a large proportion of the city's population. Many of these places of worship are of great size and stately in design.

The public buildings, notably the city hall, the court house and others; the railway terminals, a number of hotels, hospitals and numerous business structures, etc., are all metropolitan in their characteristics. A marked feature of the landscape about Montreal is the great Victoria Bridge which stretches its long line of 9,184 feet across the St. Lawrence. The Lachine Rapids, which it is proposed the superintendents and their friends shall visit, are located at a point in the St. Lawrence just above the city. Here the river contracts within a half-mile width and makes a rapid descent over a ledge of rock at a speed of eighteen miles an hour. "Shooting the rapids," as it is called, constitutes one of the exhilarating features of St. Lawrence navigation.

Montreal will intensely interest the stranger, and one is likely to bring away and retain pleasant memories of a visit to that place.

EXHIBITS AND REPRESENTATIVES AT THE CONVENTION.

Besides the active members of the Association of Railway Telegraph Superintendents, which is limited to superintendents themselves, the association has a numerous honorary and associate membership. Embraced among the latter are many manufacturers and manufacturers' agents, whose products find usage in the broad field of the telegraph and in train despatching. In accordance with custom there will be exhibited at the convention a number of devices which will in their unique adaptability for the purposes designed, appeal with special significance to the consideration of the superintendents. For instance, the Western Electric Company of New York and Chicago will exhibit a full line of their well known telephone apparatus, both for use on regular telephone lines and in connection with composited telegraph lines. A full line of their standard telegraph apparatus will be shown and an exhibit of the telephones and selective apparatus used in connection with the despatching of trains by telephones. This portion of the exhibit will be arranged so that it will show the actual operation of the selective devices and in this way demonstrate the advantages of this class of service. The exhibit will be in charge of Mr. W. E. Harkness, sales engineer, of New York, assisted by Mr. M. E. Launbranch, of New York, and Mr. C. L. Howk, of Chicago. The Northern Electric and Manufacturing Company, the Canadian branch of the Western Electric Company, will be represented by Mr. Paul F. Sise and Mr. H. D. Crouch.

Mr. John Langan, of the Okonite Company, New York, will be present at the convention as usual to represent his company's interests, whose wires and tapes, Okonite and Manson and Candee weather-proof wires are recognized as standard products. It will be remembered that Mr. Langan was last year made an associate member of the association at the meeting at Atlantic City.

Mr. John J. Ghegan, of New York, president and general manager of J. H. Bunnell and Company, Inc., than which there is no better or more favorably known manufacturing concern of telegraphic supplies, will be present at the convention.

Mr. G. M. Dodge, president of Dodge's Institute of Telegraphy at Valparaiso, Ind., will be among those in attendance at the convention. He calls attention to the fact that he is able at most all times to furnish competent telegraphers, agents' assistants, helpers and others who would, in every way, be proficient and capable. This institution points with pride to its graduates. Students at this school failing to meet moral requirements, and who lack capability, are not recommended. The annual enrollment is 500, and correspondence is solicited.

The Sandwich Electric Company, of Sandwich, Ill., manufacturers of railway composite apparatus, will be represented by Mr. H. O. Rugh, the engineer of the company. The exhibit of this concern will include their improved system in telegraphy, displaying the various types of their well-known telegraphone, an instrument in which the howler call device is utilized with marked advantage. These will be set up and shown in operation. Their new selective call designed to operate upon either single or metallic circuits, may also be studied in this combination to the best advantage.

Another exhibit may be placed by the Yetman Typewriter-Transmitter Company, formerly of New York, but now of North Adams, Mass., the showing to consist of the well-known transmitter bearing the name of Yetman. The utility of this transmitter in promoting good telegraph service on the railroads is well known from the fact that the machine is used on numerous railroad systems. Mr. Yetman has shown an interest in meeting personally with the superintendents at several former conventions, and hopes to be in attendance at that which assembles on the twenty-fourth instant.

The United States Electric Company, 95 William street, New York, will be represented at the convention by Edwin R. Gill, inventor and electrical engineer of the company; Harrison Osborne, secretary, and Howard E. Merrell, the general manager. Its exhibit will be in conjunction with that of the Western Electric Company. It will consist of a complete circuit for selective telephone calling as now in use on several leading trunk lines of railroad; of another circuit showing the adaptability of the instrument to rapid single or multiple calling on telegraph lines,

and a number of sets of instruments showing their use for telegraph purposes, all with answer-back attachments. A recommending feature in the Gill selector is its adaptability to rapid multiple calling. By its use on a circuit the despatcher can call one or all the stations, by one operation simply, and in a very few seconds of time. Keys corresponding to the stations the despatcher wishes to call are pressed down, the automatic calling device is then started and all the stations desired are readily called by means of that single operation.

The Stromberg-Carlson Telephone Manufacturing Company, of Rochester, N. Y., and Chicago, will make a display at the convention, of their magneto despatching telephone system, and in addition will show their telegraph signal system which acts in conjunction with the telephone for steam railroad signaling service. Practical demonstrations will be afforded by this exhibit.

Mr. E. W. Vogel, of the Railroad Supply Company, of Chicago, an associate member of the association, and between whose company and the railroads there has long existed close relations of reciprocity, is expected to be present at Montreal and there renew an acquaintance with the superintendents which has been regularly cemented each year at these annual reunions.

The selector as an instrument of use in connection with train despatching by telephone, is likely to receive especial consideration in the discussions among the superintendents at the business sessions of the convention. Elsewhere in this issue the merits of the Hulit device are set forth in an advertisement of Foote, Pierson and Company, of New York, licensees and sole manufacturers of the same. It is possible that Mr. Pierson may be present at the convention as the representative of his firm, influenced by a desire to cultivate a wider personal acquaintance among the railroad telegraph men.

W. R. Brixey, the well-known manufacturer of the famous Kerite wires and cables, because of the necessity of more office room to meet expanding business needs, moved recently into new quarters in the Hudson Terminal Building, 30 Church street, New York. The new Kerite offices are spacious, light and airy, and finely fitted up. The pre-eminence of Kerite products is well known, and they have long since become "standard." This position has been fairly and conscientiously won owing to the wonderful life and durability of Kerite. Kerite wires and cables manufactured half a century ago are to-day in operation, giving perfect results after this long-continued service. Mr. Richard D. Brixey, general manager for W. R. Brixey, will be present at the convention. It will be remembered that Mr. Brixey was last year elected an associate member of the Association of Railway Telegraph Superintendents. Another representative of the firm who will attend is P. W. Miller, formerly and for a number of years connected with the railway department of the American Telephone and Telegraph Company.

The Watson Insulated Wire Company, of Chicago, with offices in the Railway Exchange Building, that city, will be represented at the convention by Mr. J. V. Watson, president. Other officers of the company are, B. L. Winchell, Jr., vice-president, and E. B. Price, secretary and treasurer. This concern has recently been made the western representative of the Kerite wires and cables, manufactured by W. R. Brixey, of New York, the increasing demands for these well-known products making it desirable that sales in the great territory of which Chicago is the center, should be handled by a local concern.

The Chicago and Northwestern Railroad Company is preparing to utilize the telephone in train despatching in place of the telegraph.

The Pennsylvania Railroad School of Telegraphy, established at Bedford, Pa., under the management of J. F. Cessna, September 16, 1907, to train young men in the theory and practice of railway telegraphy and accounts, has turned out sixty graduates. The school is considered one of the most up to date of its kind in the United States being equipped with an electric miniature railroad with ten block and telegraph stations and the workings of the little railroad are most practical. Graduates of this school are provided situations on the system east of Erie.

The board of posts and communications of China has sent in a memorial to the throne relative to the establishment of a postal and telegraph college in Peking, under the instruction of experienced foreign and Chinese teachers, for training young men for service in these two departments.

Railway Composite System for Telephoning Over Telegraph Lines

To meet the demand of railway companies for a scheme whereby their existing telegraph lines may be used for telephone service, we have developed a complete line of apparatus.

Different methods are employed according to the service that is required. The railway composite system is very popular where it is desired to secure one telephone circuit for several stations from one grounded telegraph line. With this system the telephone apparatus may be added to the line without changing or rewiring the telegraph instruments. The apparatus is simple and gives splendid transmission.

Western Electric Quantity means Low First Cost

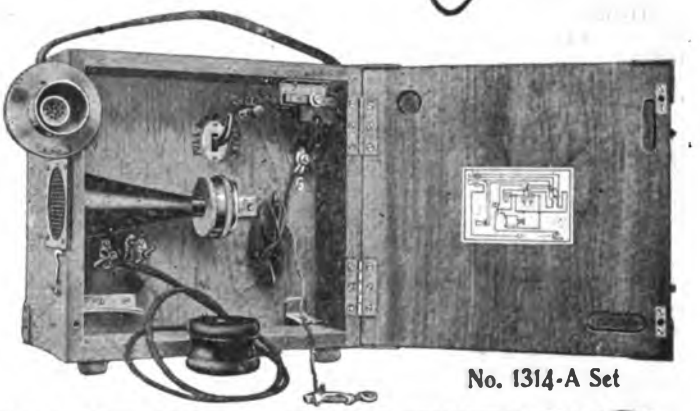
Western Electric Quality means Low Maintenance Cost

No. 1312-A Set

The No. 1312-A telephone set is for use at a permanent station.

The No. 1314-A telephone set is portable so that it may readily be carried on a train. Connection can be made with a composited telephone and telegraph line by means of the jointed pole and 100-foot cord, shown in the illustration.

Our **Bulletin T-206** gives complete information on the installation and maintenance of these telephones for railway service. This will gladly be sent free upon request.



No. 1314-A Set

WESTERN ELECTRIC COMPANY

EASTERN
New York
Philadelphia
Boston
Pittsburg
Atlanta

CENTRAL
Chicago
Indianapolis
Cincinnati
Saint Paul

Manufacturers and Suppliers of all Apparatus and Equipment used in the Construction, Operation and Maintenance of Telephone Plants

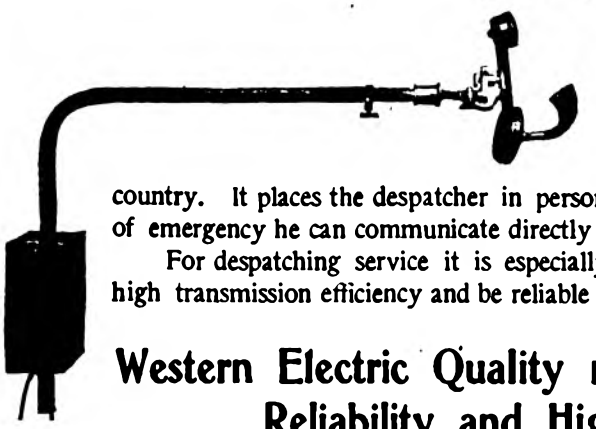
WESTERN
Saint Louis
Kansas City
Denver
Dallas
Salt Lake City
Omaha

PACIFIC
San Francisco
Los Angeles
Seattle

Northern Electric and Manufacturing Co., Ltd., Montreal and Winnipeg
Write our nearest house.

Our Apparatus will be Exhibited at the Montreal Convention of Railway Telegraph Superintendents. June 24-27

Train Despatching by Telephone Rapid and Accurate



FOR the handling of trains the telephone surpasses all other means of communication. It is no longer an experiment, but is now used by some of the largest railway systems in this country. It places the despatcher in personal touch with the operators at all times. In cases of emergency he can communicate directly with the train crew.

For despatching service it is especially important to select apparatus which will have a high transmission efficiency and be reliable under all conditions.

Western Electric Quality means Reliability and High Efficiency

The Transmitter Arm shown in the upper illustration is designed to meet the requirements of the men at the stations. The transmitter and receiver are adjustable and the arm is so arranged that it does not interfere with the vision and leaves both hands free while taking orders.

No. 128 Receiver

No. 234 Transmitter

The No. 234 Chest Transmitter in connection with the No. 128 Receiver is especially adapted for use by the despatcher. It enables him to move about freely while handling his train sheets.

We have a staff of engineers who are making a special study of telephone service for railway companies and we will gladly give you the benefit of their experience, and advise you of the apparatus best suited for your requirements.

WESTERN ELECTRIC COMPANY

EASTERN
New York
Philadelphia
Boston
Pittsburg
Atlanta

CENTRAL
Chicago
Indianapolis
Cincinnati
Saint Paul

Manufacturers and Suppliers of all Apparatus and Equipment used in the Construction, Operation and Maintenance of Telephone Plants

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Kansas City
Denver
Dallas
Salt Lake City
Omaha

PACIFIC
San Francisco
Los Angeles
Seattle

Northern Electric and Manufacturing Co., Ltd., Montreal and Winnipeg
WRITE OUR NEAREST HOUSE

We will Exhibit the Leading Selectors Manufactured for this Work at the Montreal Convention of Railway Telegraph Superintendents. June 24-27

Train Despatching by Telephone on the New York Central System.

Mr. A. H. Smith, vice-president and general manager of the New York Central and Hudson River Railroad, New York, furnishes details respecting the telephone despatching circuit recently established between Albany and Fonda, N. Y., the Mohawk division of that road, and covering a distance of forty-four miles. Mr. Smith states that thus far the new method of despatching has worked very successfully. The weight of the copper wire used in the telephone circuit is 210 pounds per mile of single wire; 420 pounds per mile per pair; transportations every half mile; number of offices cut in, exclusive of despatcher, seventeen, the selector system for calling offices being used. A description in brief as furnished by Mr. Smith is as follows:

(a) Telegraph selector; offices selected in eight seconds; operated from despatcher's office only, by automatic keys, each combination being made with sending device similar to district messenger call apparatus, consisting of one box containing selector, answer back, battery; shaft of answer back projecting through with button attached to stop gong, operated over telephone line.

(b) To operate the selector over the telephone pair the line is equipped at both ends with a No. 5-N retardation coil of 1,000 ohms across the line; the inside ends of both windings (500 ohms each) connected together to ground at the distant end; at the home end to the automatic sending keyboard which stands open except when the automatic sending key is operated, when battery flows out over the line; at each block station a graphite resistance of 40 ohms is placed in one side of the line, and a 35-ohm relay bridged on to the terminals of the graphite resistance which is operated electrically when current flows out on the line wires, and in turn, operates the selector on a local circuit; the resistance referred to in one side of the line does not impede the voice waves to any extent of the ohmic resistance; the selectors are installed on one wire of the pair at block stations 1, 3, 5, etc., and on the other wire of the pair at block stations 2, 4, 6, etc., to evenly balance the line; selections are made while conversation is carried on, and the current pulsations are not noticeable and there is no interference.

(c) Main test boards at Albany; an eleven-wire test panel was used, similar to those installed at the block stations, four jacks being used for the telephone circuit, wired, to cut off drop or line, or vice versa, to pick up either drop or line with telephone testing set, voltmeter, telegraph instruments, etc.; in the drop end we have installed Argus arresters, type B, also Western Electric protector No. 79-A, the latter being very delicate, to protect the train despatcher's ear from shock and injury; at the test board are installed two complete sets of telegraph instruments consisting of one 150-ohm relay, one 4-ohm sounder and one leg key each; all of the jacks in the switchboard are wired to a terminal distributing frame, bringing out each lug of the jacks to binding posts, at which point the line and drop are connected to spring; sleeve and insulated point bridged to sleeve and insulated point, in each wire; in other words, they are cut-off jacks.

(d) Full description of office equipment at despatcher's office consists of twenty-four automatic sending keys in protected case directly in front of the despatcher; nine Western Electric horizontal keys, four of which are locking and five non-locking; the despatching circuit proper is equipped with only three keys, one locking and ringing key, one non-locking key connected to Western Electric interrupter with which to "howl" receivers; one locking key for transmitter battery; the other keys are used to bridge on two lines or to cut in on separately, made necessary by local conditions and requirements. (The horizontal key installation is more expensive and complicated than actually required; a new layout would be installed with a small monitoring board consisting of as many keys as were necessary to take care of local conditions, the despatcher's set being connected the same as a telephone operator's set is wired to the cord circuit key, one transmitter or battery key and one ringing key.) Despatcher's telephone set consists of one head receiver of 700 ohms resistance, one high resistance transmitter; both attached to a cord and plug (the plug is inserted in jacks No. 108 embedded in the edge of the table); in addition to the selector apparatus for calling, the line key is supplied with generating current with which to ring bridging bells on the line, and in case of failure of said ringing current, a hand generator is provided; the transmitter is supplied by four cells of gravity battery, as the transmitter short-circuits the battery constantly and storage battery was not available; the telephone set induction coils are No. 23 Western Electric and wired—the primary in series with transmitter and battery, the secondary in series with 700-ohm receiver and a 2 m. f. condenser across the line.

(e) Full description of equipment at a way office; one telephone arm with receiver and transmitter mounted upon it in a rigid manner, manufactured for this company on our specifications by the Western Electric Company; one No. 23 induction coil; one 2 m. f. condenser; one 700-ohm receiver; one high resistance transmitter connected up identically as in despatcher's office, except that the transmitter key is non-locking and must be held to contact to close transmitter circuit; two horizontal keys (line key locking and transmitter key non-locking); selector apparatus as previously described; at every third station a bridging bell is strapped across the line for emergency use in case of failure of selectors, i. e., bridging bell at block station 2, another at block station 5, another at block station 9, etc. (the bridging bells so used have proved a valuable asset, not only for emergency calling but they have kept the line balance when it has been open and broken down, making it possible for the despatcher to use the line at various times when so interrupted for five or six hours without recourse to the Morse); at each station an eleven-wire test panel is installed, the line wires being carried in both from the east and from the west, with 210-pound copper insulated wire from office pole to Argus arrester, type A, and from the arresters to the switchboard jack with a No. 12 insulated copper wire; the bridge from the test panel to the telephone set key is run with No. 16 twisted pair and in the bridge is inserted Argus arresters, type B, which have fuses, would not open the line if blown, but simply open the bridging pair; the wiring of the switchboard consists of fifteen No. 108 jacks, five of which are in each line wire and five connected to ground (two jacks east and two jacks west, line; two jacks to pick up the telephone set with line east, two jacks to pick up the telephone set with line west, and two bridging jacks); the telephone bridge is soldered to the bridging jack inside of the test panel; the object of the bridging jack is to provide a means to bridge on any part or all of another circuit.

(f) Strength of current carried on circuit for operating selectors 170 volts (the voltage will be reduced considerably when new type of selector is installed).

(g) Brief description of movements in one operation in which the despatcher and one of the offices is concerned; despatcher calling an office presses automatic selector key down; when gong rings at block station, operator stops gong by turning button back, operates line key to connect set to line, at the same time places ear to receiver and holds transmitter key to contact—total number of movements five, which is accomplished in an indefinite length of time; total time consumed from starting signal until operator is ready to transact business estimated at twelve seconds; to communicate with the despatcher, cuts in his set and speaks—total number of movements as stated, four.

Submarine Cables Cut by Trawlers.

So serious has been the damage to transatlantic cables caused by steam fishing trawlers off the western coast of Ireland, recently, that notice has been brought calling attention to the same to the International Telegraph Conference, now in session at Lisbon, by the presentation of a letter signed by all the cable companies. The letter points out that not less than six cables between Europe and North America were interrupted at the same time from this cause, and the delegates were requested to call the attention of their respective governments to the matter with the view of securing measures of protection.

The Commercial Cable Company has also made representations to the State Department at Washington requesting diplomatic correspondence with Great Britain on account of the alleged depredations of these British fishing trawlers, who are stated to have frequently destroyed the company's submarine cables between America and Europe, so continually causing interruptions in cable communication. The company states that during the past three months it has been put to an expense of over $100,000 in repairing cables within fifty miles of the Irish coast on account of the acts of these trawlers, two and even three of the cables having been injured and broken at one time. On May 16 all the broken cables were repaired, but on May 18 two of them were again broken, and on May 19 a third was broken by the trawlers. Other cable companies, including the Direct and the Anglo-American, were also in trouble from the same causes. An official report concerning the situation says:

"The officials of the companies point out that the interruptions affect not only communication between Europe and America, but also between Great Britain and Canada, and consequently between Great Britain and Australia. Great Britain collects a tax on all cable messages passing to or through that country, and it is contended by the companies that no injury to the fisheries would result from excluding the trawlers from the narrow cable zone, but that, on the contrary, such a fish preserve is needed, just as seal preserves are defined and protected. There are thirteen submarine cables in the particular locality off the Irish coast, ten serving America, two serving England, and one serving France. The value of these cables is stated to be $100,000,000.

"On March 14, 1884, a convention was signed by twenty-six States (including Great Britain and the United States) by virtue of Article II., of which it was agreed to make the wilful disturbing or injuring of a submarine cable a criminal offence. This article reads as follows:

It is a punishable offence to break or injure a submarine cable, wilfully or by culpable negligence, so as to interrupt or obstruct telegraphic communication, either wholly or partially, such punishment being without prejudice to any civil action for damages. This provision does not apply to cases where those who break or injure a cable do so with the lawful object of saving their lives or their ship, after they have taken every necessary precaution to avoid so breaking or injuring the cable.

"The United States enacted such a criminal statute in 1888. While the difficulty in enforcing such a statute is recognized, owing to the fact that the offence is committed on the open seas, where there are no police, the Commercial company maintains that Great Britain is obliged by international law to prevent its citizens destroying the property of American citizens, even on the high seas. A precedent for exercising such authority is found in the Act of Congress and Proclamation of a President of the United States, which in 1896 prohibited American citizens from killing seals in the Pacific Ocean north of the thirty-fifth degree of latitude."

The shore ends of the cables will stand a strain of fifteen tons before breaking, thus showing the power of the dredging machine operated by the trawlers, for fishing purposes, their clutch on the cables reducing the strands to a mere pulp.

Code Words at the Lisbon Conference.

The cable and telegraph administrations of the world, according to a London authority, have found from experience that the extra facilities offered to the mercantile public in the unrestricted use of code vocabularies has been abused by the use of words which do not come within a reasonable interpretation of the clause agreed to by the International Telegraph Conference held in London in 1903. The object of the concession to the coding public made by the delegates at the London Conference was to facilitate the general use of code words, and it is well known to those who have full acquaintance with the working of telegraphic systems that neither in submarine cable nor land line working has any obstacle ever been put in the way of the use of code words which the telegraph operator may reasonably be expected to comprehend. It would appear that the telegraphic administrations are only making reasonable protest in calling attention to the abuse of the facilities so readily offered, and in asking the delegates at the Lisbon conference to put this matter on a more equitable basis. This is made evident by the remarks of the chairman of the Eastern Extension Australasia and China Telegraph Company at the annual meeting of the company recently held in London. He said: "It is not proposed to withdraw the privilege, but only to endeavor to have more clearly defined the condition as to the 'pronounceability' of artificial words. When the concession of admitting any pronounceable artificial words on the footing of code at ten letters to the word was granted, it was assumed that the privilege of making up codes on this basis would be used in a reasonable manner, so that the telegraph service, whether by cable or landline, might not unduly suffer, while the public would be benefitted. This expectation has not been completely fulfilled. Before the new regulations came into force the British Post Office found it necessary to issue a circular to the

Chambers of Commerce, as well as to the principal code makers of England, directing attention to the fact that codes were being compiled of artificial groups of letters which in many cases could not be regarded as 'pronounceable,' and that such words would be difficult to transmit and would lead to errors. In many cases code makers have recognized the importance of avoiding combinations which are of doubtful pronounceability, but in some cases an unreasonable use of the concession has been made. As an instance of this, such words as 'bujksrocty,' 'bywrgrocbx' and 'liqraqkper' may be mentioned as words which appeared in a code recently submitted. It will be readily understood that a telegrapher can deal more rapidly and easily with a pronounceable word, which can be more quickly grasped and remembered while it is being transmitted, as compared with an arbitrary combination of letters requiring a separate effort of attention for each letter. Thus greater speed and accuracy, which are what the public require, are obtained, and there is less need for repetitions and corrections. It is desirable and to be hoped that the condition as to the pronounceability will at the Conference be more clearly defined, in order to put some limit for the future to this tendency, which, if unchecked, cannot fail to produce results highly injurious to the telegraph service and, consequently, to the public and commerce. There is, however, no intention of adopting other than a wide and even generous interpretation which would cover the great bulk of the codes at present in use."

The Creed Receiving Telegraph Perforator.

Mr. Frederick G. Creed, telegrapher and inventor, a native of Nova Scotia, but who during the past few years has lived at Glasgow, Scotland, where he is engaged in the development of telegraph inventions, has been granted, as noted in the June 1 issue, a United States patent for improved telegraphic apparatus. More specifically, it is for a receiving telegraph tape perforator. This patent, which is numbered 887,313, is for improvements on the original invention, described and illustrated by a line drawing in Telegraph Age, July 1, 1907.

This invention has reference to that kind of apparatus for perforating a tape in accordance with electric currents or impulses received over a line wire in the manner usual in automatic Wheatstone telegraphic receiving apparatus, wherein the punch or punches used for perforating the tape are operated by a fluid pressure motor controlled through electro-magnetic mechanism that receives the electrical currents or impulses, and the correct position of the tape, previous to its being punched, is insured by correcting means that are caused to act upon a yielding feed wheel and adjust the same in a rotary direction relatively to the constantly running driving shaft used to feed the tape through the apparatus, the successive operations of correcting, punching and releasing the tape being performed so quickly that the time during which the rotation of the feed wheel is stopped, is practically negligible.

Now the present invention has for its object to further improve the construction and working of telegraphic apparatus of the kind referred to for producing practically perfect perforated Wheatstone tape from electric currents, impulses or signals received from a distant station. To this end in apparatus according thereto and in order to enable a high speed of working to be attained, the valve of the fluid pressure motor used for actuating the tape-punching mechanism and tape-correcting mechanism is actuated from the armature of an electro-magnetic device that is arranged to be placed in a local circuit and is caused to operate the armature alternately in opposite directions by currents from a separate electric generator that is under the control of a relay in the line wire over which the electric currents to be reproduced as perforations in a tape are sent, the local circuit of the said electro-magnetic device that is under the control of the said armature, the arrangement being such that the currents passing through the electro-magnetic device are reduced to or cut off at unit length, no matter in what order or manner they arrive through the line relay.

Obituary.

Francis Hughes Webb, from 1878 to 1898, secretary of the Institution of Electrical Engineers, of England, died at London, May 21, aged eighty-four years. He was a man of ripened experience in telegraph, railway and engineering matters.

Sir Robert Gillespie Reid, a wealthy railroad contractor, who had much to do with the development of Newfoundland, and who until recently had the monopoly of telegraphs in that island, died at Montreal, June 3, aged sixty-six years. He was a native of Scotland.

William Arnold Anthony, professor emeritus of physics and electrical engineering in Cooper Institute, New York, died, May 29, of heart disease, at the age of seventy-three years. Professor Anthony was born in Coventry, R. I., and was graduated from Yale. In 1895 he became professor of physics and electrical engineering at Cooper Union, and three months ago was retired from the faculty and made professor emeritus. Professor Anthony was a member of the American Institute of Electrical Engineers, the Franklin Institute of Philadelphia, and the American Social Science Association. He was president of the American Institute of Electrical Engineers in 1890-1. He was practically the first American professor of electrical engineering, his work in this direction when a professor at Cornell being altogether of a pioneer character, and having a marked influence on the trend of electrical study in this country.

The Electron Theory.

BY EDWARD J. PARTRIDGE.

(In the Journal of the Franklin Institute.)

[Concluded from June 1.]

The electron theory of metallic conduction yields a most satisfactory explanation of the Hall effect and the associated phenomena discovered by Nernst Ettingshausen and Laduc. The Hall effect, discovered at Johns Hopkins in 1878, is the lateral deviation of an electric current that is flowing through a magnetic field. The effect is observed by passing a current through a thin rectangular plate of metal that is between the poles of a powerful magnet. If connection be made to the sides of the plate and the magnet excited, a lateral current is observed. If an electric current were maintained by equal progression of positive and negative units in opposite directions there would be no Hall effect. For opposite charges moving in opposite directions would be deflected to the same side of the plate. The existence of the Hall effect demonstrates that an electric current consists of a flow that is greater in one direction than the other. The direction of the Hall effect shows that it is the negative electrons that are principally concerned in the phenomena of electric currents. In addition to the Hall effect there are a number of concomitant effects that have been discovered later, there is a difference of temperature developed between the edges and also a longitudinal difference of temperature and difference of potential. There are four entirely analogous phenomena to be observed if a current of heat is passed through the plate that is in a magnetic field. Zahn, in 1904, made an elaborate study of this field and examined his experimental results in the light of Drude's theory. His conclusion was that the theory was well substantiated if the minuteness of the quantities and the experimental difficulties were taken into consideration.

The ratio $\frac{e}{m}$ for an electron has been determined by several distinct methods with practically identical results. Because of the invariability of the properties of kathode rays when the residual gas in a vacuum tube is changed the question arose, "Is the 'm' involved in this ratio, matter in the ordinary sense?" A negative answer to this question has been rendered possible by the following course of reasoning: A charge of electricity possesses inertia. To be explicit; a sphere of metal charged with electricity requires a greater force to produce a given acceleration in it when the sphere is charged than when it is not. This fact was established in a mathematical paper by J. J. Thomson in 1881. A moving charge is an electric current. An electric current is associated with a magnetic field, which possesses a definite amount of energy. A change in the velocity of the charge means a change in the intensity of the magnetic field, that is, a change in the amount of energy stored in the field. To add energy to the field requires work to be done; a force to act through a distance.

We have long been familiar with the idea of self-induction and have illustrated the idea by saying that an electric current acts as if it possessed inertia. In future we shall say, "an electric current possesses inertia." Indeed the idea is fast gaining ground that what was called the quasi-inertia of an electric charge is the only inertia with which we have to deal. The inertia of a charge at rest is $\frac{2U E^2}{3A}$, according to the calculation of Thomson.

In this formula U is the magnetic permeability of the medium, E is the charge, and A is the radius of the sphere. Since the radius appears in the denominator, the less the radius, the greater the inertia. Consequently, any charge, however small, may have any inertia, however great, if we make the radius sufficiently small.

In this connection an additional truth developed by Heaviside and J. J. Thomson is of paramount importance. These men have shown mathematically that the inertia of a charge is not a constant quantity but a variable, that increases with the velocity of the charge. The truth of this statement can be seen almost intuitively, if we remember that an electromagnetic disturbance is propagated with the velocity of light and that therefore the lines of force of a moving charge are not radial as they are when the charge is at rest, but are bent backward approaching the equatorial plane. As a line of force in Maxwell's theory is a line of electric displacement and a varying displacement is an electric current the motion of a line of force in the direction of its length will not produce a magnetic field as there is no current, there being no varying displacement. The greater the angle up to 90° between the direction of the lines of force and the direction of motion, the greater the magnetic field that is produced. Therefore a variation of velocity when the lines of force are bent backward so as to approach the equator of the moving spherical charge will cause a greater expenditure of energy; the exertion of a greater force, which is the same as overcoming a greater inertia.

The formula expressing the dependence of inertia upon velocity shows that the change in inertia is slight until velocities approaching that of light are reached. In the neighborhood of the velocity of light the increase in inertia is very rapid, so that inertia asymptotically approaches infinity with increasing velocity, reaching infinity at the actual light velocity. This deduction from theory has been subjected to experimental test by several experimenters. The first work in this line was with kathode rays, but the velocities are not sufficient to cause changes of inertia much beyond the limits of experimental error. Stark has, however, demonstrated a slight increase of inertia in extremely rapid kathode rays.

The crowning work in this field has been done by Kaufmann, of Göttingen, who has determined

the ratio $\frac{e}{m}$ for the β rays of radium by simultaneously observing the deflection produced by electric and magnetic fields of known strength. Rays from a small quantity of radium salt were permitted to pass through a small hole in a piece of lead and then to pass through the electric and magnetic fields maintained in the same space, and finally to fall upon a photographic plate. The difficulty of the experiment can be appreciated by noting that the exposures were of two or three days' duration, and that the electric and magnetic fields had, of course, to be maintained constant during the entire time. Owing to the fact that β rays from radium are not homogeneous, but have very different velocities, the electric and magnetic fields spread them out into a kind of spectrum, each point of which corresponds to a particular velocity. The measurement of the deviations permits the determination of both "m" and the velocity. Kaufmann has demonstrated not only that the mass increases with increasing velocity, but also that the entire mass is due to the charge of electricity that constitutes the particle. From Kaufmann's measurements a judgment is possible concerning the relative probability of the various theories that have been advanced concerning the constitution of the electron. That is, as to whether an electron is a rigid sphere of negative electricity or a sphere that is deformable with change of volume or deformable without change of volume. The conclusion which Kaufmann reached in 1906 was that the rigid electron or the electron that is deformable without change of volume equally satisfy his measurement. To distinguish between them would require a greater accuracy than has hitherto been attained. The whole question as to the possibility of an electron whose shape is not constant arose from the failure to observe any optical phenomenon that is dependent upon the motion of the earth through the ether, provided the source of light is terrestrial. Lorentz has shown that if a contraction takes place in the direction of motion and no change at right angles thereto, that no effect can be perceived by an observer moving with the apparatus. This whole question bristles with difficulties and is still under discussion. This much is certain, the inertia of an election is all electrical inertia.

Combining this fact with the knowledge derived from the study of the Zeeman effect, that there are electrons in the atoms of matter, we have strongly suggested that all inertia is electrical. In other words, that atoms are aggregates of electrons.

J. J. Thomson has elaborately worked out the conditions of stability of groups of electrons supposed to be held together by the attraction of an atomic nucleus of positive electricity. He supposes the electrons in an atom to be arranged in rings and to be rotating around a center. He finds that if the number of electrons be increased that the number in a ring may increase to maximum, but that any further increase in the number of electrons will cause the formation of more rings. He shows that atoms built up of electrons whose numbers vary from 59 to 67 show a progressive change in properties, recalling the progressive change in a line of the periodic system of the elements.

The work of J. J. Thomson is the most ambitious attempt to explain the periodic system. Thus far it is merely an analogy.

Our knowledge of the structure of the atom is at the present time almost limited to the results of Stark and his school on the canal rays. Canal rays are observed in the space back of the perforated kathode rays. They are particles that carry a positive charge of electricity. They have masses of atomic magnitude and so are sharply differentiated from kathode rays, whose particles have masses but 1/1000 that of the hydrogen atom. Canal rays have been observed in many gases. And also the lines in the spectra show the Doppler effect, that is, are displaced in consequence of the motion of the centers of the emission of the light. The Doppler effect in the spectra of canal rays has been observed in the lines of mercury, nitrogen, carbon, oxygen, helium, argon, potassium, sodium, and lithium.

It appears from Stark's work that an atom-residue, positively charged, after having lost a single electron yields a spectrum consisting of series of doublets. If the atom has lost two electrons it emits light, the spectrum of which contains series of triplets. The band spectrum appears to be radiated from the complete atom that is electrically neutral.

From what has been thus far said it would appear that the electron theory has been elaborated to explain certain results of modern experimental physics. The idea has, however, been reached through another channel. Plank by applying general reasoning of the style adopted in thermodynamics and energetics in general to the theory of radiation has reduced the mass of the hydrogen atom and also the charge that he denominates the elementary quantity of electricity. This determination of Plank of the mass of a hydrogen atom, and the charge constituting an electron, is, to my mind, one of the most remarkable intellectual results ever achieved. Drude speaks of them as being probably the most accurate values of these constants that we possess.

The fact that no optical phenomenon depending on the motion of the earth through the ether has even been observed, provided the source of light is terrestrial has lead Einstein to formulate what he calls the principle of relativity. This principle assumes that no such phenomenon is possible. Plank and Stark combined in this principle with the principle of least action and deduced the most remarkable fact that the mass of a body at rest is equal to its internal energy divided by the square of the velocity of light. The smallest inertia with which we are acquainted is that of a single electron. This inertia multiplied by the square of the velocity of light gives us the value of the elementary quantity of energy.

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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American Cable Across the Pacific ..... July 16, 1903
Alaskan Telegraphs ..... Jan. 1-16, Feb. 1, 1905
Atmosphere and Earth Electrical Conditions, E. C. Walker, Dec. 16, 1904
Barclay Combination Quadruplex Rheostat ..... July 1, 1903
Barclay's Direct Repeating Relay for Multiplex Circuits, July 16, 1902
Barclay Printing Telegraph System, W. H. Jones ..... May 16, 1905
Barclay's Repeating Relay, Main Line Relay and Box Relay, Jan. 1, 1903
Barclay Typewriting Telegraph System ..... Jan. 16, 1904
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British System of Timing Messages ..... Dec. 1, 1902
Buckingham Long Distance Page Printing Telegraph ..... Sept. 1, 1902
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Cable Station in Mid-Pacific, Our, Dr. Martin Crook ..... Feb. 16, 1905
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C. K. Jones' Automatic Telegraph Circuit Protector and Signaling Machine ..... June 16, 1903
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Composite Teleg. and Telep. on Canadian Pacific Ry. ..... Mch. 1, 1904
Composite Telephone Lines ..... Mch. 1, 1905
Crehore-Squire Automatic Telegraph System ..... May 16, 1902
Definitions of Electrical Terms, Mch. 16, Apl. 1-16, June 1, July 1-16, 1904
Delany's, P. B., Automatic Telegraph System ..... Mch. 16, 1903
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Direct Polar Relay Repeater of the Postal Telegraph-Cable Company ..... Oct. 16, 1903
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Pollak-Virag System ..... Mch. 1, 1903
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Postal Telegraph-Cable Company Rules Governing Construction and Repair of Telegraph Lines, Apl. 1-16, May 1-16, 1904
Printing Telegraph Systems, Modern High Speed, J. C. Barclay ..... Nov. 1, 1904
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Progress of Telegraphy During Last Thirty Years, W. Maver, Jr. ..... Mch. 16, 1904
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Protection of Telegraph or Telephone Lines When in Hazardous Proximity to High Speed Lines ..... June 1, 1904
Random Recollections of 145 Broadway, W. P. Phillips ..... Feb. 1, 1905
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Directory of Annual Meetings.

Association of Railway Telegraph Superintendents meets at Montreal, Que., June 24, 25, 26 and 27, 1908.

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 Detroit, Mich., August 19, 20, 21.

Old Time Telegraphers' and Historical Association, will meet at Niagara Falls, N. Y., September 16, 17, 18.

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 at Fort Worth, Tex., on June 18, 1908.

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.

Letters From Our Agents.

KANSAS CITY, POSTAL.

Harry Morlan, for some fifteen years manager of the Postal company's Board of Trade office in this city, and for the last two years manager of the main office, recently resigned and went to Dallas, Tex., where he is identified with the Metropolitan Book Company, a concern in which he is substantially interested. No man engaged in the telegraph business in Kansas City and vicinity was more popular than Mr. Morlan with the business public or with employes. When he was promoted to the main office from the Board of Trade the grain men presented him with a handsome gift in appeciation of his long and satisfactory service in handling their business. When Mr. Morlan retired the employes of the main office joined in tendering him a handsome gold watch, Superintendent A. B. Richards making the presentation. Mr. Morlan carried with him into his new field of endeavor the best wishes of all telegraph people in Kansas City.

NEW YORK, WESTERN UNION.

The operators of the commercial news department celebrated their first general outing in recent years at "The Cove," West Brighton, Staten Island, on May 31. The gentlemen made it an occasion for family enjoyment, and the ladies who accompanied the party divided the field honors with their escorts by contesting in numerous games for which appropriate prizes were awarded. A baseball game between the married and single men resulted in a hard-earned victory for the single team, score, 9 to 7. Tables were set for sixty-five in the ballroom of the hotel, and after the meal there were speeches, vocal and instrumental music and some entertainment by Mr. A. G. Waring, magician, who is also a member of the force. Mr. H. M. Heffner, chief operator of the commercial news department, acted as toastmaster at the dinner.

The many friends of Mr. J. R. Heidemark, assistant southern wire chief, were shocked and grieved to learn of the sudden death of his wife, which occurred May 26.

Mrs. J. F. Zeiss, nee Anna Schaefer, a former operator in this office, wife of the chief operator of the Postal Telegraph-Cable Company, this city, died at her residence in Bloomfield, N. J., May 12.

James Lowen Young, of Superintendent Skelton's staff, and Miss Josephine Veronica Hopkins, of the main office operating department, were married in Brooklyn, June 7. The wedding trip took the couple to the Catskill mountains.

Morse Electric Club Outing.

The outing of the Morse Electric Club will be held at Cove Hotel, New Brighton, Staten Island, July 18. Colonel R. C. Clowry, president of the Western Union Telegraph Company, has kindly placed the cable tug "Western Union" at the disposal of the club to convey the members to and from the grounds. Athletic games and a game of baseball will be indulged in. An enjoyable time is expected. The entertainment committee are arranging for the comfort and enjoyment of the members. J. B. Van Every is the president of the club, and R. J. Murphy, secretary.

The Old Time and Military Telegraphers' Reunion.

The annual reunion of the Old Time Telegraphers' and Historical Association and the Society of the United States Military Telegraph Corps, will meet this year at Niagara Falls, N. Y., on September 16, 17 and 18. This in reality will be the holding of the postponed meeting of 1907, deferred at that time because of the disturbed conditions in telegraph circles. Practically the same programme of entertainment determined upon last year, will be carried out this year, and headquarters will be established at the International-Cataract Hotel, as before designated.

The officers of the Old Time Telegraphers' and Historical Association are: Harvey D. Reynolds, president, Buffalo, N. Y.; George A. Burnett, Buffalo, N. Y., I. McMichael, Toronto, Ont., and George F. Macdonald, Ottawa, Ont., vice-presidents; John Brant, secretary-treasurer, 195 Broadway, New York.

The officers of the Society of the United States Military Telegraph Corps are: Colonel William B. Wilson, Holmesburg, Philadelphia, president; William L. Ives, New York, vice-president; D. H. Bates, 658 Broadway, New York, secretary and treasurer. The latter has sent out the following circular letter, addressed to comrades in that organization:

"Colonel William B. Wilson, our president, believing that our reunion at Niagara Falls this year should be a large and impressive one, will, with the assistance of the executive committee, use every effort to bring about that result. In view of this he has appointed the following committee to act in conjunction with the president and committee of arrangements of the 'Old Time Telegraphers' and Historical Association,' whose headquarters are at Buffalo, N. Y.:

"George A. Burnett, chairman; Joseph Anderson, Madison Buell, and Thomas A. Laird, Buffalo, N. Y.; James K. Parsons and Harry L. Gregg, Rochester, N. Y.; Joseph Schnell, Binghamton, N. Y.; George J. Goalding, Erie, Pa., and I. McMichael, Toronto, Ont.

"It is desirable that your committee see that proper arrangements are made to the end that the dignity and importance of the historic services of yourself and comrades are fittingly recognized."

The People's Mutual Telegraph Company has been incorporated in Chicago, with a capital of $25,000; the purposes as stated in its papers, being to conduct a general telegraph business. The names of the incorporators as given are W. F. Sommers, Michael Feinberg and Solomon Salins.

Chicago Western Union Notes.

Officials are very busily engaged these days in preparing for the national Republican convention, to be held on June 16. Both telegraph companies will have well equipped offices in the convention hall, The Associated Press and The United Press offices being located between those of the two commercial companies.

Advance information indicates that a large number of press representatives will be here and the boys are hoping that the file of press matter will insure them a few hours' extra time.

New apparatus for the Barclay printing department is being received at frequent intervals and we anticipate that the system will soon reach all heavy trunk line points. In fact, they are nearly all reached by that system now.

Many operators in Chicago are still seeking employment, both companies have engaged quite a number of men in anticipation of the heavy work during convention week.

It is expected that quite a number of the most expert men will be given an opportunity to go to Denver during the Democratic convention, which will no doubt make a pleasant outing for them.

Quite a number of the younger men in the office are evincing an interest in electrical and mechanical lines. Some of them are studying to become wire chiefs or repeater chiefs, others are familiarizing themselves with duplexes and quads, and others still are taking up the study of the printer apparatus, hoping thereby to fit themselves for promotion in the future.

G. F. Bassett, chief clerk of the operating room, has returned from a pleasant two weeks spent in Denver. During Mr. Bassett's absence W. H. Marshall filled the position as chief clerk and has been kept busy by Chief Operator Cowan almost continuously since Mr. Bassett's return, working on convention matters.

Mrs. Pollock, who had the misfortune to fall and break a limb during the icy period of the early spring, has recovered sufficiently to again resume her duties, although she is compelled to use crutches.

We understand about fifty men have been given signs by Chief Operator Cowan since June 1, and many more are anxiously awaiting the time when they will be made happy.

The following well-known telegraphers were recently assigned to duty at La Porte, Ind., to handle press matter during the Gunness investigation: C. H. Bowles, M. J. Duggan, W. H. Meacham, F. C. McLean, Chas. R. Sims, B. L. Wilson and J. C. Salak.

Mrs. Langdon Smith, the widow of Langdon Smith, a former well-known telegrapher and newspaper writer, lately deceased, committed suicide, in Brooklyn, on June 10, the action being due to grief over the death of her husband which caused insanity to develop.

A practical illustration of a "bug" on the wire was afforded recently on a Western newspaper circuit. There was an interruption, and the wire chief was summoned to investigate the cause of the trouble. Hastening to the desk on which the instruments are placed the chief discovered a large water bug perched on the connecting points of a pole changer, effectually closing communication on that circuit. The stranger had paid for its curiosity, for 385 volts of electric current had passed through the beetle, which had died before enjoying the sensation of holding up an important news story. An old telegraph operator standing by said it was the first time he had seen the real thing in his thirty years' experience.

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