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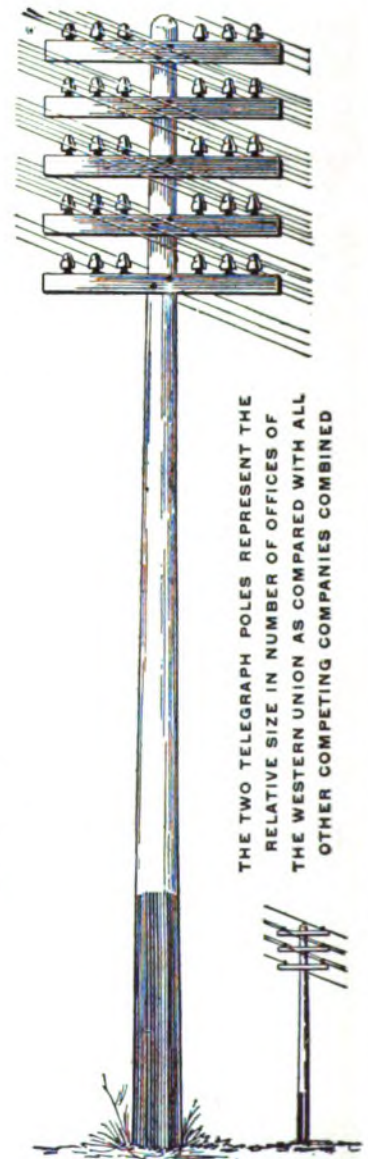
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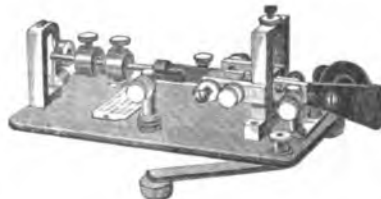
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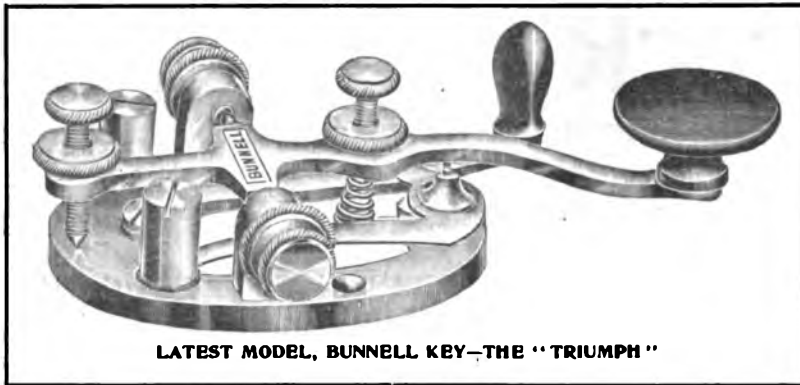
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TELEGRAPH AGE

No. 21.

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Twenty-fifth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons Concerning the Operation of Repeaters.

The younger members of the telegraphic profession during the early stages of their pursuit of electrical knowledge are undoubtedly retarded in making progress by failing to first seek out that particular part in a piece of electrical apparatus upon which the operation of the latter chiefly depends.

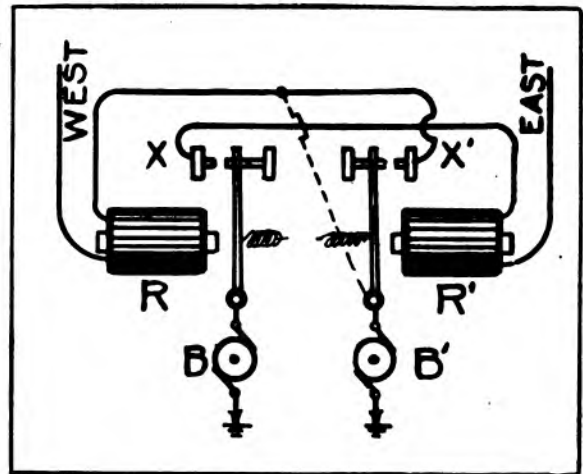
As a rule it will be found that this identical part performs the same kind of work in nearly every type of apparatus constructed for a similar purpose, but the manner in which it is compelled to do so depends upon the particular method the inventor of a given type employs in placing it in harness. Hence, a correct initial guiding knowledge of the principle involved in the operation should be sought first of all. Thus, in the study of repeater operation, a subject suggested for the benefit of students, the importance of following this policy will be readily recognized.

As it is not the purpose of this article to explain the complete operation of repeaters, only such parts of the connections of a full set are

shown in the diagrams as is necessary to display the distinguishing features of different standard types in general use to-day.

Of course, the student understands that the object of a repeater is to simultaneously repeat into a companion circuit by mechanical means the identical letters or characters that are being transmitted on some other wire. This is accomplished by utilizing the lever of a relay or other magnet in the capacity of a key which opens and closes the companion circuit at its contact points through which latter the second wire is connected.

The simplest form of a repeater is obviously that of an ordinary main line relay and sounder. The lever of the relay acts as a key in the sounder circuit and, of course, duplicates all characters made in the main-line circuit. If we substitute a long telegraph circuit for the ordinary local sounder circuit, as shown in the accompanying diagram, the relay lever will still act as a repeater and operate the long circuit just the



same as it did the shorter one. Hence, the first step in the connections of a repeater is to run the second wire through the contact points of the relay or a transmitter controlled by the relay, as is usually the case, which belongs to the first circuit; and, vice versa, run the first wire through the points of the relay that belongs to the second circuit, as shown in the diagram. In this way each relay is in a position to operate the companion circuit by means of its lever, provided a means is furnished for maintaining the sending circuit intact through the repeating apparatus itself. That is to say, provided the contact points of the relay in the circuit being repeated into can be prevented from opening the sender's wire and thus permanently disconnecting the latter's battery.

In all types of repeaters it is absolutely necessary that the repeating relay in the circuit receiving the duplicate signals shall not act as a repeater through the mere operation of opening and closing the sending wire, and yet be able to do so when any one on the receiving wire wishes to break or send into the first circuit. A glance at the diagram will show why provision against double or simultaneous relay action is required.

For example: If, without such provision, an operator on the eastern circuit should open his key, relay R at the repeating station would open relay R' also, and as the sender's battery is reached through the contact points of relay R', he could not close his own wire again because that circuit would remain open at X', the contact points of relay R'. At that same time, the other wire would also remain open at contact point X of relay R because the sender could not close the latter.

One of the first methods of getting around this difficulty was devised by Wood, in what is called Wood's button repeater. His scheme was to construct an extra path around the contact points of the relay in the receiving circuit similar in effect to that shown by the dotted lines, so that whether that relay lever is open or closed the sender in the companion circuit will find his circuit closed through the repeating station at all times. Of course, the receiver's repeater relay, R', must not be so shunted when he breaks or wishes to send, hence a means of shifting the shunt (dotted line route) was necessary. This feat is accomplished by means of a switch lever, not shown in the diagram. When turned to the right the repeating points of one relay is shunted and when placed to the left the companion relay is in turn likewise rendered harmless.

The weak point in repeaters of this type is that they require the constant presence of an attendant to watch for "breaks," and to turn the switch every time an operator on the second wire wishes to break, after which he must again reverse the position before the sender can resume. The switch and its actual connections for shunting the contact points are purposely omitted in this diagram with the object of simplicity. The dotted line illustrates the method employed and discloses the principle involved in the construction of the earliest of pioneer repeaters. The actual connections of a full set may be found in almost every standard work on telegraph engineering.

In actual practice the levers of the main-line relays are not now used as the direct repeating device. The latter is usually the tongue of a transmitter in a local circuit controlled by the said relay. Of course, the operation is the same as if accomplished by the relay lever alone, but the transmitter tongue method is more efficient because, being in a strong local circuit, the magnet is not subject to alterations in the strength of its energizing current, as is the case with the main-line relay. In the absence of any other means of repeating from one circuit into another, the Wood repeater was considered a great in-

vention, but the necessity of an attendant soon set others to work devising methods for doing his work automatically. The manner in which the difficulty was surmounted will be shown in the next installment of this article.

(To be continued.)

Recent Telegraph Patents.

A patent, No. 900,238, for a telegraph key, has been granted to James Z. Tucker and Lawrence V. Tucker, of St. Louis, Mo. Patentee has a circuit-closing lever on the telegraph key, spring impelled into circuit-closing relation, and is constantly in position to open the circuit by the hand of the operator during the transmission of signals.

A patent, No. 900,553, for a telegraphic relay, has been issued to Isidor Kitsee, of Philadelphia. Has two series of selenium cells, and electromagnetic means for each of said series to place in the circuit a selenium cell of normal resistance after the lowering of the resistance of a neighboring cell.

A patent, No. 901,012, for an electric battery, has been awarded to Isidor Kitsee, of Philadelphia. The method of depolarizing an electrode provided with a catalytic substance, which consists in impinging a jet of fluid thereon when out of contact with the electrolyte, whereby oxygen is imparted to said electrode.

The following patents have expired:

Patent No. 460,572, for a printing telegraph, held by M. G. Farmer, of Eliot, Me.

Patent No. 460,619, for a steno-telegraphic apparatus, held by A. Wood, of Philadelphia, Pa.

Patent No. 460,771, for a telegraph block system of railway-traffic control, held by D. C. Coombes, Lewisham, and W. Rowe, of Marrickville, New South Wales.

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Every telegrapher who loves his profession, who is determined to master its technicalities, and thus insure for himself the confidence and respect of his official superiors and place himself in the direct line of promotion, should subscribe for and become a careful reader of Telegraph Age.

The Barclay Printing Telegraph System.

BY WILLIAM FINN.
(Part X.)

THE REPEATING APPARATUS.

In any system of automatic telegraphy requiring the use of electro-magnetic recording apparatus, the speed of signaling is limited by the mechanical and electrical inertia of the apparatus itself, and is more or less affected by the resistance and electro-static capacity of the conducting wire, as well as by inductive interference from neighboring wires.

The duration of battery contact at a high rate of speed is necessarily short, and the current developed is small to begin with; but its strength is still further reduced by the electro-static

apparatus plays a very important part in the attainment and maintenance of high speeds over long automatic circuits, and considerable care and attention to matters of detail are necessary in the design, construction and adjustment of its various parts to adapt them to the exacting requirements of fast working.

In Fig. 29, which is a theoretical representation of the essential parts and connections of the automatic duplex repeater, it will be seen that the main-line relays R and R' are so arranged as to combine the functions of both receiver and transmitter; or, in other words, the currents which enter their coils from the terminal stations are directly translated by those instruments into the opposite lines without the interposition of local apparatus as ordinarily employed for effecting such purposes.

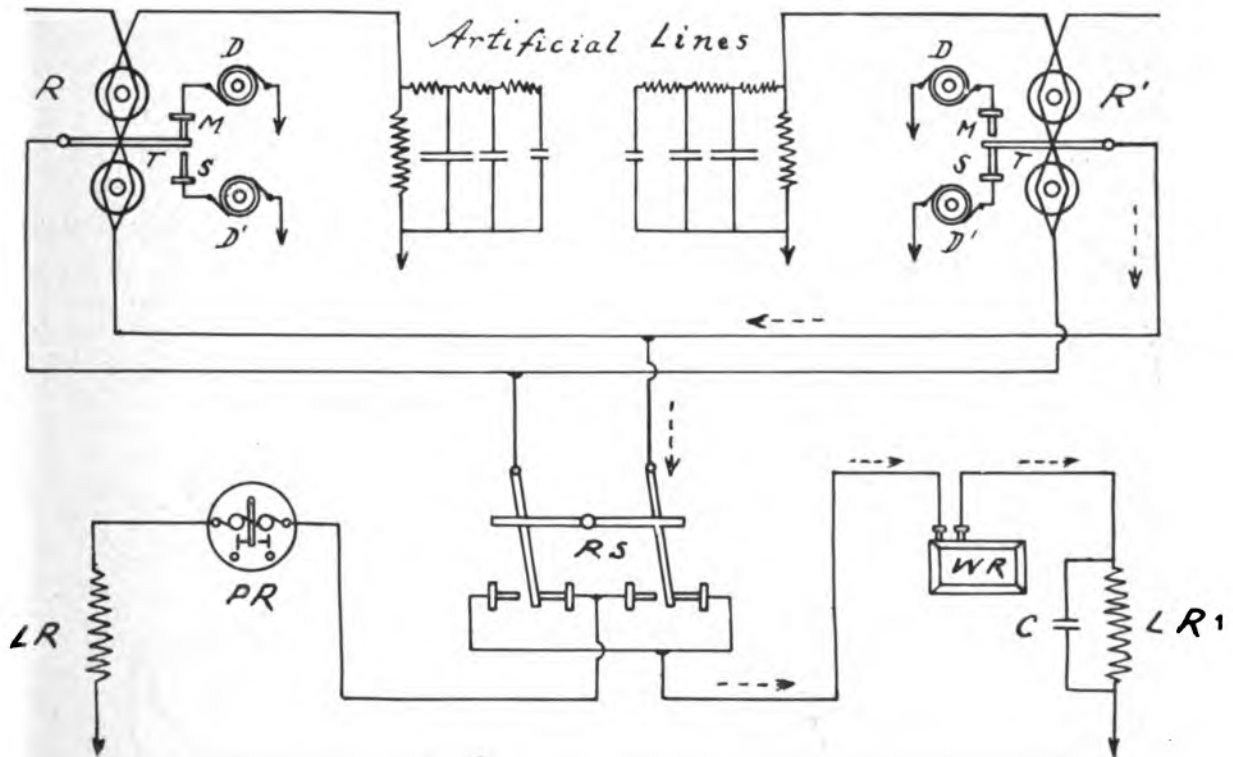


FIG. 29.—THEORETICAL CONNECTIONS OF AUTOMATIC DUPLEX REPEATING APPARATUS.

capacity of the wire, which absorbs or accumulates upon its surface a portion of the current that would otherwise reach the receiving apparatus. The amount of current thus absorbed depends upon the length and surface of the conductor, as well as upon its proximity to the ground and other conductors; but by far the greatest detriment from this particular cause is felt from the presence of underground cables in the circuit.

The inductive interference from adjacent wires likewise increases with the length of the circuit, the tendency of such interference being to mutilate the signals, especially during the busy hours of the day. This inductive action as well as that arising from static condensation is greatly modified by dividing a long line into sections and introducing repeaters in the circuit. The repeating

The method of accomplishing this will be readily understood from the drawing. The coils of R and R' are multiple wound and differentialized, as shown in Fig. 30, and are joined to the main and artificial lines in the customary way for duplex working.

Now, when the series of rapid reversals or alternating currents enter the relay coils from the distant transmitting apparatus, they start the armature tongues T (Fig. 29) vibrating between the contact stops connected with the repeating dynamos, from which the marking (M) and spacing (S) currents flow out into the opposite lines. A small portion of the outgoing current is diverted from each of the main lines into a separate leak or derived circuit of high resistance, a Wheatstone receiver, WR, being placed in one.

and a polarized relay, PR, in the other of these branch circuits. The particular object of this device is to enable the attendant, by means of the reversing arrangement, RS, to switch the recording instrument, WR, into one or the other of the branch circuits, and to thus determine how the currents leaving the repeater pass into either of the main lines. In this way a single receiver is made available for both sections of the circuit, while the polar relay, PR, which actuates a local sounder, and which interchanges positions with that of the receiver upon the reversal of the switch, serves the purpose of directing attention to irregularities, calls and other occurrences on the particular section of line in which it happens to be placed.

The amount of resistance in the leaks LR and LR' is never less than 5,000 ohms, and is normally maintained at about 25,000 ohms, with the view of draining off as little as possible of the main-line current. To increase the magnet-

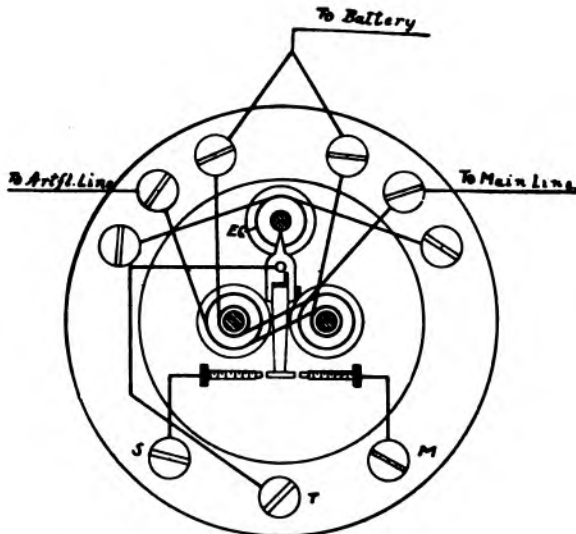


FIG. 30.—MULTIPLE WINDING AND CONNECTIONS.

izing effect of this small leakage current (whose course through one of the leak circuits is indicated by the direction of the dotted arrows) the "leak" receiver is specially wound to about 1,200 ohms, which provides a sufficient number of convolutions or ampere turns to properly actuate the instrument.

As the rate of working in practice is generally regulated at the repeater office, and is more or less determined by the condition of the signals as noted upon the leak receiver, WR, it will be evident that the latter should be adjusted to record the passing signals at the highest speed attainable, since any defect that would lower its efficiency below that of the terminal apparatus would be apt to reduce the carrying capacity of the circuit. When from retardation, deterioration, or other causes, the leak instrument fails to come up to the required standard, a condenser C, of small capacity, placed around the leak resistance, LR', in the manner shown in Fig. 29, will generally remedy the defect.

The instrument of primary importance in connection with the repeater set is the main line relay, portions of which are shown in Figs. 30, 31 and 32. The main and artificial coils are each

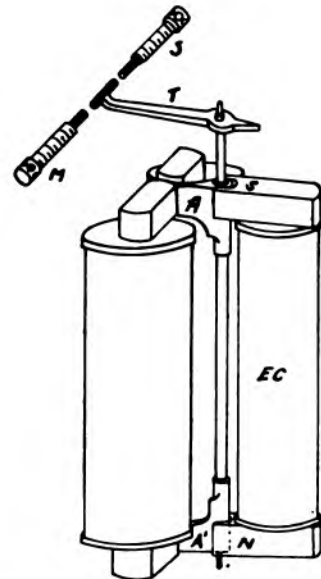


FIG. 31.—SIDE VIEW, SHOWING COIL ARRANGEMENTS.

wound to a resistance of 150 ohms with the multiple arrangement of winding illustrated in Fig. 30. Polarity is induced in the armatures A, A' (Fig. 31) of the relay by means of an energizing coil EC (Figs. 30 and 31) through which a local

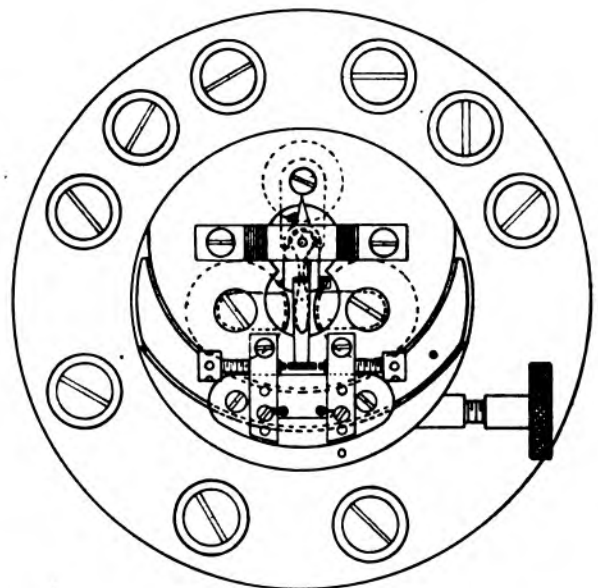


FIG. 32.—TOP VIEW OF STANDARD AUTOMATIC REPEATING RELAY.

current of about 50 milliamperes flows in such a direction as to develop south magnetism at the upper, and north magnetism at the lower, end of its iron core. This energizing coil (wound to 100 ohms resistance) has taken the place of the curved permanent magnet originally employed, as the result of a tendency on the part of the latter to

gradually lose its magnetism and thus impair the efficiency of the relay.

(To be continued.)

Personal.

Mr. Robert J. Wynne, United States Consul-General at London, formerly Postmaster-General, and at one time a well-known telegrapher, reached this country last week on a leave of absence.

Mr. William Marconi, of London, England, the inventor of the wireless telegraph system bearing his name, was a New York visitor last week and paid his personal respects to the various telegraph and cable interests.

Colonel William Bender Wilson, of Holmsburg, Philadelphia, president of the Society of the United States Military Telegraph Corps, was in town last week, coming over to attend a meeting held in behalf of the society named.

Mr. Henry H. Hall, of Ashtabula, O., an old-time operator, who has just been elected president of the Children's Homes Association of Ohio, is the founder and superintendent of the Children's Home of Ashtabula County. For more than fifty years Mr. Hall was a telegraph operator. He transmitted from Cincinnati the first message announcing the nomination of James Buchanan for the Presidency. In 1857 and 1859 he worked beside James F. Leonard, the reputed first operator to read by sound. Mr. Hall was manager of the Western Union office in Pittsburg when the preliminary convention placed John C. Fremont in the field for President. He sent the telegrams of Horace Greeley, who was reporting the convention. For many years Mr. Hall has been engaged in philanthropic work, in which he has been very successful.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Charles C. Adams, second vice-president, announces that construction work on the company's lines connecting Goldfield, Tonopah and other mining centers, will be completed by December 1. They follow the route of the Tonopah and Tidewater Railroad. The lines in question extend north from Ludlow, Ariz., where they connect with the overland system of the company.

Mr. Charles P. Bruch, third vice-president, together with E. B. Pillsbury, general superintendent of the eastern division, have lately completed a general tour of inspection of offices in the New England states.

Mr. Edward Reynolds, auditor of the company, is back from a vacation spent at Catskill, N. Y. During his stay in the mountains an old-home celebration took place, the festivities lasting a week. Mr. Reynolds is secretary of the Greene County Club in New York, which has a large membership of natives of that county who are now residents of the metropolis.

Mr. Minor M. Davis, electrical engineer, went over to Boston the other day, called thither on business connected with his department.

Mr. Arthur L. Edgecomb, superintendent at Boston, who has spent a vacation in hunting deer in the northern wilds of Maine, is back again at his office.

RESIGNATIONS AND APPOINTMENTS.

Mr. H. L. Bush, formerly of Newport News, Va., has been appointed manager at Newbern, N. C., vice H. L. Kellogg, transferred to Washington, D. C.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

At the annual stockholders' meeting, held October 15, two vacancies in the directorate were filled by the election of Paul Morton and Robert M. Gallaway, to succeed Morris K. Jesup and J. D. Layng, both deceased.

At a meeting of the directors of this company held on Wednesday, October 21, for the election of officers for 1908-1909, all of those previously holding office were chosen, namely: Robert C. Clowry, president and general manager; George J. Gould, J. B. Van Every, Thomas F. Clark and G. W. E. Atkins, vice-presidents; A. R. Brewer, secretary; M. T. Wilbur, treasurer; J. B. Van Every, auditor, and George H. Fearons, general attorney. The executive committee was continued as follows: Thomas T. Eckert, chairman; Robert C. Clowry, John T. Terry, George J. Gould, Joseph J. Slocum, Edwin Gould, Frank Jay Gould, Jacob H. Schiff, William L. Bull and Thomas H. Hubbard.

Mr. William Marconi, of London, accompanied by John Bottomly, of the Marconi Wireless Telegraph Company of America, were recent executive office visitors. They were much interested in the Barclay printing telegraph system.

Among other executive office visitors was W. F. Williams, superintendent of telegraph of the Seaboard Air Line Railway, of Portsmouth, Va.

The Barclay printing telegraph system has been installed on the Kansas City-Denver circuit.

The law department now located on the sixth floor of the building, in order to acquire much needed additional space and to effect a closer relationship of legal interests, will remove to the fourth floor, taking possession of the office hitherto occupied by the laboratory, and those by C. F. Patterson, general manager of the American District Telegraph Company of New Jersey. This new arrangement will bring George H. Fearons, the general attorney of the company, and Henry D. Estabrook, solicitor, together. Mr. Patterson will occupy the quarters vacated by Mr. Estabrook on the second floor, and in addition thereto the room tenanted by Daniel Skelton, superintendent of the American District Telegraph Company of New York, the latter in turn being transferred to the rooms formerly devoted to the

claim department on the same floor. The laboratory and the claim department of the general attorney's office will now be found on the ninth floor.

The Cable.

The Chino-Japanese convention regarding the Port Arthur-Chefoo cable was signed at Tokio, October 12.

The English postmaster-general states that the question of laying a new telegraph cable, or establishing a wireless service to the Shetland Islands, is under consideration.

Mr. Robert Morrell, superintendent of the West Indies and Panama Telegraph Company, with headquarters at St. Thomas, D. W. I., has returned with his family from Europe, after a stay abroad of several months.

Mr. Ernest Grigg, who has charge of the West Indies and Panama Telegraph Company station at St. Croix, W. I., and who has been in this country on a three months' leave of absence, returned to his post of duty a few days since, sailing on the steamer Korona.

Cable communication was interrupted October 28 with:

Venezuela	Jan. 12, 1906
Madura Island (Dutch East Indies)	Feb. 3, 1908
Macao	Aug. 29, 1908

Messages can be mailed from Hongkong.

Mr. James M. Robertson, who has been connected officially with the Mexican and Central and South American telegraph companies for twenty-eight years, tendered his resignation to the boards of directors to take effect October 15. The boards of both companies accepted Mr. Robertson's resignation with much regret.

A patent, No. 900,743, for a relay, has been granted to Isidor Kitsee, of Philadelphia. A cable relay comprising the relay proper, a localized electric circuit adapted to move the movable parts in one direction and mechanical means to move the movable parts in an opposite direction, said localized electric circuit shunting the relay proper.

The laying of the new cable of the German South American Telegraph Company to South America has been commenced, says the London Electrical Review. The first section, which will extend from Emden via Borkum to Teneriffe, will be 2,163 nautical miles in length. The cable will then be continued from Teneriffe, either direct to Pernambuco, in Brazil, or to Monrovia, in Liberia, first, and thence to Pernambuco. The length for the direct route from Teneriffe to Pernambuco would be 2,766 nautical miles, whereas the alternative route would increase the length to about 3,766 nautical miles. It is considered that notwithstanding the greater cost of the latter scheme, it would prove to be more remunerative owing to the prospect of the cable being extended to the German colonies in West

Africa. "The Blätter für Post und Telegraphie," in making reference to the subject, emphasizes the fact that the German colonies of Cameroon and German South-West Africa can at present only be reached telegraphically by British lines, and that the British and French also possess a cable system to Brazil. There is no doubt that the German nation is keenly alive to the necessity of providing as far as possible a national system of cable, and that it is shirking no expense to attain it.

Radio-Telegraphy.

It is understood that the wireless telegraph experiments recently conducted for the British admiralty by Dr. Lee De Forest have satisfied the admiralty officials, who, under the direction of the inventor, have been testing wireless telephony between the admiralty officials at London and vessels of the channel fleet. The officials express themselves as in favor of the permanent installation of the De Forest system.

In an interview recently Mr. Marconi stated that at present he is planning to do nothing with the Marconi station at Cape Cod, attention being concentrated on the more powerful stations at Glace Bay, Nova Scotia, and that at Clifden, Ireland. Reserve apparatus is now being installed at Glace Bay, duplicating the present equipment there. About 100 horsepower, he stated, is required for transatlantic communication. At present no attempt is made to send more than twenty words a minute.

Wireless telegraphy is being rapidly developed on the Pacific Coast and ocean. It is predicted that within a very few months all of the steamers plying the Pacific Ocean will be equipped with wireless telegraphic apparatus, and steamers destined from the United States to the Orient will be in wireless communication throughout their entire voyages with shore stations at Honolulu, Guam, Fiji and other islands, at all of which points submarine cable connections can be made reaching all parts of the world.

The Signal Corps of the United States Army has linked far-off Nome with Seattle by means of the wireless telegraph. A report from Lieutenant E. Alexis Jeunet, of the Thirteenth Infantry, declares that the wireless stations at Cape Nome, Fort Egbert, Fort Gibbon, Fairbanks and Circle City have undergone successful tests. The station in Nome will be put into service in the immediate future. The work on the military stations was greatly delayed by accidents to supplies in transportation. One of the steamers carrying supplies from Seattle was crushed in ice floes, and salt water worked havoc to the equipment.

Municipal Electricians.

Mr. W. Y. Ellett, superintendent of fire telegraph, Elmira, N. Y., was a business visitor in New York last week, when he took occasion to call on many friends.

The Study of Telegraph Engineering.

Young telegraphers frequently write to Telegraph Age requesting information relative to what course of action or study is best adapted to secure promotion in the service in which they are engaged. A number of such inquiries coming to hand of late we determined to seek personal opinions to be offered in reply, obtained from among those who are actually filling positions of responsibility in telegraph engineering, those who have gained standing and place the result of their own labor, the demonstration of individual intelligence and worth. We accordingly addressed a note of inquiry to a number of such gentlemen, well known in their respective stations, stating what was required, with the request that we might be favored with an answer, pleading in behalf of our action the welfare of others just entering upon their careers, and for the benefit of the service. We have often had our own say respecting subjects of this character, as our readers well know, and we are glad to be able to publish in this instance opinions derived from other, outside, authoritative, independent and unprejudiced sources.

Here are the letters thus far received, and we bespeak their very careful perusal and serious consideration of the great fundamental truths contained therein.

Mr. J. C. Barclay, the assistant general manager and electrical engineer of the Western Union Telegraph Company, New York, under date of October 17, has the following to say:

My advice to a young operator to become useful in the electric department of the telegraph service is to be observing of what goes on around him, study the principles of the different circuits, obtain theoretical, as well as practical, knowledge of the Morse circuit, the duplex, the quadruplex, and other systems within his observation; acquire an understanding why two or more messages can be transmitted simultaneously over one wire, not simply know that it is done, but how it is done; post himself on the switchboard, learn how to make changes and patch wires, not be satisfied in knowing that changing a wedge or a peg brings certain results, but find why it does so.

The young man who starts in that way and always endeavors to know something more than just what his regular duties call for, will not need much further coaching. He will doubtless acquire the knowledge that fits him for the better position. There never were greater opportunities for advancement in the telegraph service than at the present time, and the young operator who knows how to do things is more in demand than ever.

Mr. Minor M. Davis, electrical engineer of the Postal Telegraph-Cable Company, New York, writes under date of October 19:

Replying to your letter asking me what I would advise a young operator to do to become useful in the electrical department of the Postal company, I would say: If a young operator really has the inclination to learn all about the electrical equipment, and if he has a fairly good education, there should be no great difficulty except the earnest effort that must be made. Beginning with the simplest apparatus, the young operator could gradually become familiar with the operation of every instrument and machine by persistently trying to do so. He should

take up the study of one instrument after another, and in following this course he will soon find that his knowledge is increasing. An understanding of the operation of a sounder helps to an understanding of a relay, and so on. He should be sure that he understands Ohm's law, as applied to ordinary circuits, and can begin by studying it in relation to the operation of a simple Morse circuit. The articles by Mr. Willis H. Jones in Telegraph Age will help him greatly. I think that, as a rule, chief operators are very willing to answer questions if the one who asks them is careful not to be troublesome, and does not give the impression that he merely wants to talk the matter over. There are now many good books treating on the general subject of telegraphy and applied electricity, and it is usually easy to get access to them in libraries, even if they are too expensive to buy. In the large cities there are many helpful free lectures upon electrical subjects. Very likely opportunity for study would have to be found outside of regular hours of duty; but this is not a hardship if the interest is real. Nothing stands in the way of a comprehension of every instrument and machine used by the company if the young operator is in earnest. Advancement may be slow, but it has come to most men who have demonstrated they were ready for promotion.

Mr. John F. Skirrow, associate electrical engineer of the Postal Telegraph-Cable Company, New York, in a communication dated October 20, has this to say:

I know of no better way to answer your query than to cite my own experience. While working as an operator I used much of my spare time studying the principles of telegraph apparatus in such text-books as I could secure. On every occasion possible while at work I checked up my study by examination of the instruments and apparatus and by questioning those in charge of them. Before long an opening occurred where some one with a knowledge of multiplex systems was needed to take charge of such apparatus at a summer office. Those who had observed my desire for knowledge recommended me for the place and I started in as a summer chief operator. When the summer was over I returned to the key, but within a few weeks a vacancy occurred in an office due to the promotion of a chief operator, and my application being on file for such a vacancy I was examined and found to be qualified for the position. Further advancement came along the same lines.

My experience has invariably been that by the time I had qualified myself to do better work, the better work arrived.

Mr. F. E. d'Humy, assistant electrical engineer of the Postal Telegraph-Cable Company, New York, under date of October 20, makes this contribution:

A young telegraph operator can prepare himself to be useful in the electrical department of a telegraph company, by gaining a clear, practical and theoretical understanding of the electrical equipment in general use by the company of which he is an employe. The theory is open to all in the many good text-books published, or by correspondence or evening schools. The fundamentals, however, must be mastered first, then all that follows becomes easy. The practical knowledge can be gained only by close observation, application and willingness to lend a hand wherever needed. No matter how disagreeable the work it should be accepted eagerly. A good man learns when pulling on the end of a rope. Knowledge thus gained is the best knowledge. A young man displaying willingness and intelligence is usually soon called upon to help, first, on minor work, then on more important, and so on until ultimately he may find himself regularly employed on important electrical work.

Mr. J. P. Edwards, division electrical engineer of the Postal Telegraph-Cable Company, at Atlanta, Ga., makes the following reply, writing under date of October 19:

In replying to your letter requesting that I give you a few words as to the advice which should be given a young operator wishing to fit himself for advancement as his knowledge of telegraph engineering increases, the first requisite, of course, is the ambition to advance in the service. If any young operator really has this ambition, he does not require a great deal of advice. First of all he will be discontented with his lack of knowledge of the principles of electrical engineering, as applied to telegraphy. The difficulty which confronts the telegraph companies now, especially in the engineering department, is to find men qualified to fill the positions which are open. The result is that a great many positions are filled with men who are not capable of rendering the service which their position demands. I believe that there is a great tendency in the minds of many telegraph employes, to feel that the companies should take up the raw material, and drill it into ability, rather than for the raw material to fit itself for the position or advancement. You will recognize the bad practice which would result if physicians, for instance, were educated in this way. In other words, if our physicians did not fit themselves before beginning the practice of medicine, conditions would be such in a little while that our graveyards wouldn't hold the 'dead ones.'

The man who is looking for advancement, should be willing to render a service the value of which to his company is greater than his benefits, or his idea of the value of his remuneration, and to feel in so doing that he is merely doing his duty.

I should advise the young operator, in the absence of a thorough training in the principles of electrical engineering before he entered the telegraph service, to prepare himself by taking a course in one of the several correspondence schools giving instruction of this kind. The young operator should not make the mistake of taking a course in 'telegraphy' in one of these schools, as he will be merely taught to telegraph. There are a number of good text-books on the subject of electrical engineering, which would be of great value to the young operator, if he should read them intelligently, but I believe the very best course he could pursue would be to take a correspondence course in 'telegraph engineering,' supplementing this by a full course in electrical engineering, if he sees fit, or by pursuing a course in home reading and study of the various text-books, after the completion of the correspondence course.

Mr. J. F. Looney, division electrical engineer of the Postal Telegraph-Cable Company, at Chicago, under date of October 24, makes this contribution to the subject:

It is first of all necessary that a young operator prepare himself for a position as sub-chief. In this way he can get wide experience in the working of wires, the current necessary to operate different kinds of circuits, testing of wires, instruments, etc. He can gather a great deal of information from books on the subjects, but practical experience is a great help. He must also be reliable and regular, so that he can be depended upon.

A great many young operators do not care to give up their own time to avail themselves of opportunities to learn something that will make them useful and fit them for advancement when the time presents itself and their knowledge of the telegraph business and telegraph engineering has reached a state where they would be valuable to the company.

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International Conference on Electrical Units and Standards.

The conference was begun on October 12 at the rooms of the Royal Society, Burlington House, London. Mr. Churchill, president of the Board of Trade, opened the proceedings with an address, in which he pointed out that fourteen years had elapsed since the last International Congress was held, and welcomed the delegates. Rules of procedure, based upon those employed at the Berlin Conference on Radio-Telegraphy, were adopted, after which Mr. Churchill, on behalf of the British government, nominated Lord Rayleigh as chairman, and retired.

The first subject discussed was the value of the ohm; the C. G. S. system of measurement was formally adopted, on the motion of Mr. Trotter, and it was agreed that the international ohm should be defined in terms of a column of mercury. Professor Warburg, of the Reichanstalt, proposed a resolution fixing the mass of the column at 14.4521 gm. and its length at 106.300 cm., and adopting the procedure for the determination of its resistance set out in "Specification A." The resolution was discussed and referred to the technical committee.

On October 14, the question whether the volt or the ampere should be adopted as the secondary primary standard was discussed, and the ampere was chosen by a majority of 19 to 4.—London Electrical Review.

The Electrical Review and Western Electrician Consolidated.

The Electrical Review, of New York, has purchased the Western Electrician, of Chicago, and dating from November 7, the two journals will be published at Chicago as a single publication under the title of the "Electrical Review and Western Electrician." Mr. Charles W. Price, in an announcement card, says:

"The present form of the Electrical Review will be continued, and there will be no change in the personnel or management. The publication office will be in the Marquette Building, Chicago, and the present New York offices at 13 Park Row, supported by a strong editorial and business organization, will be maintained."

To initiate commercial business Mayor George A. Hibbard, of Boston, by invitation recently met Patrick B. Delany, the inventor, and H. Lee Sellers, president, of the Telepost Company, at its Boston office, and exchanged greetings with Mayor Adam P. Leighton, of Portland, Me., the message being transmitted over the wires of the Atlantic Telegraph Company, lately acquired by the Telepost Company.

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

The Lisbon International Telegraph Conference.

The question of the greatest public interest which was discussed at the International Telegraph Conference, recently held at Lisbon, Portugal, was that relating to code telegraphy. Prior to the Conference of London in 1903, code words could be formed only of real words taken from certain languages, but the Conference of London, in a spirit of liberality, conceded the privilege of using "artificial" words. The intention of that Conference was that "artificial" words should be similar in appearance to real words and capable of being easily pronounced. But the ingenuity of code-makers, eager to obtain the maximum number of combinations, soon led to the formation of codes containing millions of "artificial" words which could only be pronounced with difficulty, if at all; and as telegraph operators cannot grasp such combinations readily, more time is needed for their transmission, with the result that the speed of working is seriously reduced, while the number of errors is largely increased.

It was generally agreed at the Conference of Lisbon that it would be impracticable to withdraw the privilege which had been conceded at the London Conference, and that, in the circumstances, the only course was to maintain generally the existing rules for counting words of different kinds, and to take such steps as were practicable to keep the use of the privilege within reasonable limits by improving the standard of pronounceability.

The matter having been referred to a sub-committee, composed of representatives of Great Britain, France, Germany, Belgium, and the Netherlands, it was finally decided (1) that the test of pronounceability should be the ordinary (or current) usage of each language, and (2) that code-makers should have the privilege of submitting their codes to certain administrations, with a view to obtain an assurance from the International Telegraph Union that the words contained in the codes comply with the regulations.

The power of giving this assurance as regards such codes as are submitted and are found, upon examination, to be prepared upon a proper basis, was confided to the telegraph administration of Great Britain, France and Germany.

The submission of codes for government approval will not be compulsory. Codes which do not possess a government certificate, either because the owners do not submit them or because, when submitted, they fail to satisfy the examiners, will still be available in so far as they may comply with the letter of the regulations. It is obvious, however, that a guarantee that the words in a given code will be accepted without question at any telegraph office throughout the International Telegraph Union, will be a strong recommendation in its favor, and the administrations, by declining to give such guarantee until they are satisfied that it is fully merited by the character of the words in the collection, will be

enabled indirectly to exercise a considerable amount of pressure on the persons concerned.

The Conference effected numerous improvement in point of detail relating to the working of the service, and various minor concessions were granted to the public, as, for example, a reduction of the cost of obtaining repetition in cases of error, and permission to use both figure and letter cipher in a single telegram and to combine figures and letters in a single group of five characters when denoting commercial marks.

Paris was selected as the next place of meeting for the International Telegraph Conference in 1915, which will then celebrate the golden jubilee, as the Conference first met in Paris in 1865.

The Portuguese delegation proposed that the jubilee should be commemorated by the erection of a monument similar to that which marks the twenty-fifth anniversary of the foundation of the International Postal Union. The proposal was that the monument should be unveiled at Paris during the Conference of 1915. But the French government intimated that they would prefer that, as in the case of the postal memorial, the choice should fall on Berne, Switzerland, where the International Telegraph Bureau is located, and with this modification the proposal was agreed to in principle, subject to the approval of the respective governments.—St. Martin's Le Grand.

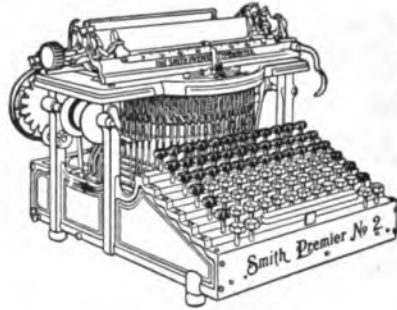
Grievances of English Telegraph Operators.

At the Trade Union Congress, held in England during the second week in September, a resolution was passed protesting against the employment of ex-soldiers and sailors as telegraph operators, at lower wages than those received by established telegraphers. The recommendations of the Hobhouse Committee, advocating an extension of hours from forty-eight to fifty and one-half in some branches, and the exclusion of future entrants as skilled mechanics from the benefits of sick and holiday pay and medical attendance, were condemned, a protest against the practice of permitting newspaper proprietors and news agencies to provide their own operators for transmitting news telegrams was formulated, and the removal of the civil disabilities of civil servants was called for.

The Aurora Due to Sun Spots.

During the recent magnetic disturbance due to the aurora borealis, which played such havoc in telegraphic transmission, Professor John A. Brasher, of Pittsburg, scientist and astronomer, made a measurement of an enormous sun spot, which he photographed. The spot covers an area of 2,250,000,000 square miles of the surface of the sun and has a temperature estimated at 60,000 degrees above zero. Dr. Brasher believes there is a close connection between the aurora borealis and the sun spot.

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NOVEMBER 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.

All the Fault of the Telegraph Company.

The impelling causes that induce suits at law are many and varied. Some owe their origin to ridiculous circumstance. The telegraph companies are not without experience as defendants in answer to innumerable and frequently fantastic complaints, diversely conjured up and brought against them. A man possessed with a sense of humor, with the dramatic instinct, with the faculty of picking up matter for editorial squib or for storied sketch, may confidently approach the law department of the telegraph satisfied that his search for material wherewith to embellish his page, will be rewarded.

Kentucky has always maintained a reputation, sometimes fierce and never uninteresting, in the arena of the law. The other day in this former favorite hunting ground of the North American In-

dians, a suit for damages was brought against the telegraph. It seems that in a moment of apparent abstraction, yet with a confidence born, may we say, of blissful innocence, a citizen of that state, but of what station in life we are not informed, having occasion to leave his carriage, requested a messenger boy to hold his horse for him at the curb's edge, for a few minutes. With the good nature characteristic of his kind, the lad obligingly grasped the rein near the bit and patiently stood by while the owner of the animal went in discharge of his errand. This was an exemplification of duty well begun. But trouble was brewing. What caused the horse to awaken to a realizing sense of the comparative freedom of his position, is not known. Whether acting in contempt of the diminutive figure standing by his head and refusing to yield obedience to a stranger whose only distinction from the ordinary small boy of the town was the uniform which he wore, unlike the livery of any coachman or footman the equine might ever have known or observed; or whether seized with a sudden impulse to measure his locomotive powers with a passing auto, or startled by the sound of music produced by a street band around the corner—whatever the reason, the horse with a sudden jerk freed himself from the boy's grasp, the same having been held in meditative and unsuspecting mood, after the manner of messenger boys, as all observant witnesses of that genus will cheerfully testify is their natural attitude when on duty—whatever the reason, we say, the horse broke away and started at a mad pace up the street.

Disastrous consequences, of course, could only be the natural result of such a wholly rash and unwarranted movement, and when the owner finally appeared on the scene and gazed upon the wreck spread before him, not in grief but in anger, he forthwith declared in tones that by no stretch of the imagination could be called dulcet, that the telegraph company was accountable for the calamity. Only a mind of vast occult power and fine discrimination could have traced thus instantly the subtle agencies determining relation between cause and effect, and sternly place liability where it belonged. Such a spontaneous decision marked the triumph of intellectual force clearly rising to the height of genius. The telegraph company should be taught a lesson, its responsibility should be determined and fixed by a court of law, a limit should be placed upon its operations; it should be severely admonished that its business was the transmission of messages and not to lend itself as an influence in causing horses to run away. Here was a grand opportunity to vindicate the rights of the people against grinding monopoly!

Damages caused by the runaway accident were speedily computed by the discomfited owner to be \$250, and for this lump sum the majesty of the law was invoked against the offending telegraph company. An ignorant populace conversant with the facts, applauded the move, and held their mouths agape in awe and wonderment at the pro-

ceedings. Others, not so sure of the reasonableness and equity of the claim, wore a broad grin. When the case came to trial and the learned judge promptly dismissed the action, of all those called in attendance none were more interested in the outcome than the aforesaid messenger boy, whose relief and satisfaction found vent in the remark: "Gee, I'se t'ought de old bloke was gwine fer to bust de company!"

The Wisconsin Decision.

The decision of the Supreme Court of Wisconsin against the state eight-hour law, which was referred to in our October 16 issue, for railroad telegraph operators is significant in reflecting the new spirit in which legal questions affecting the railroads is being met. The decision rests upon the power of the federal government to regulate interstate commerce and its adjuncts, to the exclusion of state regulation where it overrides or changes the decree of Congress.

Ability and independence have marked the Supreme Court of Wisconsin and its decisions have always been highly regarded by courts in other states, remarks an exchange. Its invalidation of the state eight-hour law for railroad telegraphers gives a decision of far-reaching importance, affecting state laws which add to the measures adopted by Congress for the regulation of railroads. It is logical that if the states cannot regulate the hours of railroad telegraphers, there are other phases of regulation that they have undertaken which are invalid. When the states that went in heavily for regulation brought about confusion in the operation of railroads by adding to the numerous changes required under the Hepburn law, it was not believed that many of the additions would stand legal test. As the states commenced enforcement of their new laws, common carriers were subjected to conditions that obstructed operation and worked serious loss to the railroads, without, as subsequently proved, affording better conditions to shippers and travelers. The necessity of systematic and uniform laws applying to commerce and transportation became apparent simultaneously with the attempted enforcement of the state laws. The Minnesota rate decision cleared away some of the confusion, but numerous state laws remain that are in the same position as the Wisconsin eight-hour measure in their relation to the federal law. They should be eliminated, and the public and the railroads would both be gainers by the elimination. This must be apparent after the hearing of complaints by Alabama and Georgia before the Interstate Commerce Commission in Atlanta, when these states invoked the federal law for a relief that the state laws were unable to give.

An extension of the Wisconsin decision will be of advantage in other states and can be obtained without raising the cry of "state rights," which was behind state regulation of the railroads. The state regulation, as far as it has gone, has

harassed the railroads without any benefit to the public. As a matter of fact, the public has lost with the railroads because reduction of revenue has lessened efficiency and prevented improvements. It is just as well to look the facts in the face and support the courts when they draw the line between legitimate state regulation and the state regulation that invades the field of interstate commerce.

The head of a light company at Fort Worth, Tex., himself a former judge, adopted drastic measures the other day when he appeared on the scene armed with a shotgun, and forced the city lineman, who had commenced the cutting away of wires, said to be dangerous, to quit his job and hurriedly descend from his coign of vantage on the pole. Might does not always make right either when directed for or against any given object, but in this case an apparently reckless cutting of wires, which included telegraph call circuits in its demolition, as well as those providing for a lighting service, was happily frustrated. A show of municipal sanity afterward prevailed when a truce was declared in order to give the energetic judge an opportunity to obtain an injunction.

Telegraph tolls in Oklahoma have been cut to a flat rate of twenty-five cents ten words, and two cents for each additional word, day rate, and one cent night rate to all points within the state, by a proposed order signed by the corporation commission, October 3. The order also requires every telegram to show the time of filing and receipt, so that the recipient can tell for himself whether it has been delayed in delivery.

"Telephony," in the shape it now reaches us, having merged within itself the American Telephone Journal, Sound Waves, the Telephone Magazine and The Telephone, presents a compact, condensed whole, at once stronger and better and in every way superior to the previous separate and diverse units. Telephony has become a trust in telephonic newspaper literature in the best meaning of that much-abused and misunderstood term, and as such has a warmer welcome always at our editorial table.

Mr. J. McMillan, superintendent of the Canadian Pacific Railway Company's Telegraphs, at Calgary, Canada, writes: "I thank you for keeping my subscription good. I take great pleasure in assuring you that in my opinion Telegraph Age is the most helpful and instructive telegraph journal published to-day, and no man, young or old, can afford to be without it. Telegraph Age keeps abreast of the times and represents the best there is in telegraph interests."

One good way to avoid excitement is to live within your income.

Telegraphy and Telephony Over Electric Light and Power Circuits.

An arrangement permitting the use of electric light and power circuits for telegraphy and telephony has been invented by Professor R. B. Goldschmidt, of Brussels. Results obtained by him over 110 or 220-volt lines are said to be equally good. The circuits may at the same time supply any number of electric lights and motors without the slightest disturbance. The transmitting device comprises a sensitive and powerful microphone, capable of withstanding currents of great intensity, which is connected in the circuit of an accumulator, a coil of thick wire and an adjustable resistance for regulating the intensity of the currents through the microphone. The coil forms the primary of a transformer, the secondary of which contains a great number of turns of fine wire of sufficiently high resistance to make the insertion of additional resistance unnecessary, when the secondary is connected to the electric light or power line. When the microphone is spoken into, the voice produces in the secondary circuit of the transformer alternating-current oscillations, which superpose themselves on the direct current flowing through the conductors, and, the direct current being scarcely influenced by alternating currents, as is well known, the latter act on the telephone at the receiving end through another transformer, similar to that at the transmitting end. The calling apparatus consists essentially of a toothed-wheel interrupter placed in the circuit, which, when rotated, produces electric currents in the transformer at the receiving end. A sensitive relay connected in the secondary of this transformer serves to establish a local circuit through a battery and bell. A condenser is connected around the interrupter for the prevention of heavy sparks. When the telephone receiver is hung on a hook, the secondary circuit is closed by the relay; when the receiver is removed the hook rises and the telephone is automatically connected in the secondary circuit of the coil. In order to telegraph it is only necessary to substitute a Morse key for the calling device, and a Morse apparatus or sounder at the receiving end for the bell. Experiments made by Professor Goldschmidt have shown that during the day the transmission is effected as perfectly as over ordinary telegraph and telephone lines, but in the evening, when many local circuits are simultaneously opened and closed, the transmission is a little more difficult. Among the practical applications of the invention are the sending of telegraphic or telephonic messages simultaneously from a central station to a number of subscribers, and communication between central stations and electric railway cars. On account of the high resistance of the transformers the current consumed is almost negligible and the devices are not much more expensive than those ordinarily used.—Translated and abstracted from *L'Electricien* (Paris), by the New York Electrical Review.

Annual Report of the English Telegraphs.

The report of the Postmaster General of England, for the year ended March 31, 1908, shows that 85,969,000 telegrams passed over the post-office wires, as compared with 89,493,000 in 1906-07, a decrease of 3.9 per cent. The decrease in the number of telegrams was to some extent apparent only. The decrease in the number of ordinary telegrams was most marked in the case of London local traffic, and was due no doubt to the increasing popularity of the telephone. In connection with the revision of the system of counting messages, the Postmaster-General caused a careful and prolonged inquiry to be made into the expense of transmitting press messages, and found that the loss to the state on these messages, which passed at the special rates prescribed by the Telegraph Act of 1868, might be estimated at about £225,000 a year. There was a deficit on the telegraph and telephone systems of £851,876, or £209,178 more than in the previous year. The number of foreign telegrams sent to and from the United Kingdom during the year (exclusive of certain telegrams dealt with entirely by cable companies) was practically the same as the number sent during 1906-7, viz., 9,147,000. During the year thirty-nine licenses (covering fifty-eight installations) were granted under the Wireless Telegraphy Acts. Of these thirty-seven were for experimental purposes and two for private business purposes.

First News of a Great Crimean Victory.

The first message bringing to London, England, the news of the victory of the British and French troops in the battle of the Alma, fought on September 29, fifty-four years ago, was received by Mr. W. J. Pragnall, then an operator in the service of the Electric and International Telegraph Company.

Mr. Pragnall describes the incident as follows: "On Sunday, September 29, 1854, when all was quiet, The Hague called and said, 'Look out, important telegram for the government.' This, which I received, was the message announcing the victory. Immediately afterwards we were overwhelmed with other telegrams for the press and from generals, officers, and others to their parents, wives, etc. Later the lists of the killed and wounded came through. These were sent to the official Gazette office in St. Martin's lane and printed and distributed. Then came another rush of messages to relatives and friends all over the country. Many of them had to be kept until the offices opened on Monday morning. It was an afternoon and evening long to be remembered in London telegraph circles."

Mr. Pragnall entered the service of the Electric and International Telegraph Company on December 23, 1849. He is, therefore, an honored forty-niner of the British telegraph service.

Telegraph Age is headquarters for electrical and telegraph books. Write for catalogue.

The London Central Telegraph Office.

For some time engineering changes in the wiring arrangements of considerable magnitude have been taking place in the central telegraph office, London, and now the cabling and general wiring is as well arranged as it can be, having regard to the fact that the general post office west building is not particularly suitable for housing the largest telegraph office in the world. The objects aimed at were, in the first place, to secure immunity from fire risks, and secondly, to facilitate and reduce the cost of changes in the positions of circuits, which the exigencies of the traffic in the central telegraph office appeared so frequently to demand.

In October, 1907, the final installation of the metropolitan intercommunication switch was completed, and as a consequence of the amount of table space set free, and for other reasons affecting staff administration, a re-organization of the central office was decided upon. The work, according to a return which the controller prepared, involved the removal from one portion of the building to another of nearly fourteen thousand pieces of apparatus, and was accomplished without the slightest hitch or delay to traffic.

The circuits are now located as follows: Ground floor, switch working sets for tube office traffic and the message telegram room; first floor, telegraph school; second floor, cable room—circuits working to south-southeast offices, minor midland and northern offices; third floor, main provincial circuits, also Scotland, Ireland and the Channel Isles: on this floor also are the news and special sections; fourth floor, metropolitan intercommunication switch, its working sets, direct circuits to certain metropolitan offices, and circuits working to the home counties.

Incidentally an increase in the number of cord telegraph carriers, concentrator switches and a rearrangement of the pneumatic tube system were contemplated, but these portions of the scheme are being proceeded with slowly. Experiments are now being conducted with a view to determine the most suitable arrangement for working the pneumatic tubes automatically. Two types of valve are being tried, one actuated by what may be termed a pneumatic relay, and the other being operated electrically.

Authority has been given for a trial of the Murray system to Berlin, the apparatus now in use at the central telegraph office on a Dublin circuit being utilized.

Efforts have for some time been made by inventors to increase the speed of preparing slips for Wheatstone automatic transmission. It was, of course, at once realized that the typewriter principle was the correct one, and this has been adopted by all the inventors. The first system tried was the Creed, which used air for perforating. Recently M. Kotyra, of Paris, devised an arrangement by which the pneumatic perforators in use in the central telegraph office were operated by three solenoidal electro-magnets placed over

the valve pistons. A typewriter keyboard is employed, the depression of the keys bringing into action a motor-driven rack and pinion device which provides by means of a brush passing over horizontal segments for the completion of the electro-magnet circuits. M. Kotyra has recently modified his apparatus, dispensing with the pneumatic perforator and operating a four-slip perforator directly by solenoidal electro-magnets of more powerful construction. He has also introduced a much improved form of keyboard.

The Gell two-slip keyboard perforator, which was originally tried in conjunction with a key-speed Wheatstone transmitter for sounder working, and a four-slip perforator of similar but stronger construction are also being tried experimentally in the news division. In the Gell instruments each letter or figure is perforated by one operation, and in this respect the Gell differs from the Kotyra.—Post Office Electrical Engineers' Journal, London.

Lead-Covered Cables Injured by Insects.

The Home Telephone Company, of Santa Barbara, Cal., has been having considerable trouble from perforations in its lead-covered cables made by insects, says the Electrical World. Some of the trunk lines consisting of three hundred to five hundred wires in lead casings, have been found to have hundreds of perforations about one-eighth inch in diameter, evidently made by the insects, with the result that there has been considerable interruption of telephone service.

This kind of damage to lead-covered cables was made the subject of a paper by Mr. John Hesketh, electrical engineer for the State of Queensland, Australia, presented before the St. Louis International Electrical Congress of 1904. The matter was investigated by Mr. H. Tryon, entomologist for the Queensland Department of Agriculture, who reported that the greatest damage to the cables was caused by the larva of the beetle *Ecelonerus*, but that the beetle *Xylopertha* and also the beetle *Bostrichus Jesuita* were taken from holes in lead casing. In experimenting with other insects it was found that the elephant beetle would gnaw through the lead sheathing of a cable, and also the caterpillar *Xyleutes boisduvali*. In the discussion of Mr. Hesketh's paper, a case was noted where a grub about one and one-half inches long had done considerable damage to cables in Savannah, Ga., and an article published at that time gave an account of similar damage to cables in Shanghai, China, but which was ascribed to wasps.

An increase in the pay of telegraph operators in India has been approved by the Indian Telegraph department.

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

Interesting Cable Exhibits at the New York Electrical Show.

In the comparatively short time of the development of electrical possibilities one would scarcely expect to find a history of much extent or of much romance. Yet in the exhibit of the Commercial Cable Company, at the New York Electrical Show, held in Madison Square Garden, October 3-14, commemorating the fiftieth anniversary of submarine cable communication, and showing the growth and expansion from the beginning, there was an exceptional interest both in the mechanical perfection of the present, and in the background of achievement amid the first difficulties.

The apparatus by which messages under the sea are sent now was shown in a complete set of instruments and devices for sending and receiving, put side by side with the early flashlight mirror system. The alphabetical code transferred by the siphon tube to the narrow ribbon and the perforated tape used in sending were explained in detail.

Models of two ships, the Mackay-Bennett of the older type and the Restorer, built in 1902, gave illustrations of actual laying of cables, of the means of paying out, grappling and taking in, and of repair work. Pictorial representations of the other ships which played a part in the construction of the cable lines, the Leopard, Agamemnon, Niagara and Susquehanna of the Atlantic telegraph cable fleet and the Great Eastern were hung on the walls.

The difference in the working capacity of the cable of 1858 and that of to-day appears in copies of two early messages, one of them sent the day after the cable was laid and the second five days later. The first one reads:

Valencia, Aug. 17, 1858. Commenced 12.56, finished 1.21. Rec'd by Lundy and Bell. Ward, Whitehouse mr Cunard wishes telegraph McIver Europa collision Arabian put into St. John's. No lives lost. will you do it stay anxiety nonarrival. DeSanty.

The second despatch tells of rejoicing in the United States at the accomplishment of the cable transmission, and ends: "Please give me some news for New York. They are mad for news." The time occupied in sending the two messages was twenty-five and twenty-three minutes, respectively. Now two of equal length could be sent and transcribed in less than one minute.

In the pictorial description of the laying of the early Atlantic cables, there were a number of watercolor paintings of scenes aboard the Great Eastern, and of the landing of the ends at Heart's Content, Newfoundland, and Valencia, Ireland. The watercolors are the originals of those made by Robert Dudley to illustrate a pamphlet by W. H. Russell, LL.D., dedicated to Albert Edward, Prince of Wales, by special permission, and published in 1865. Forty-four pictures in all were in the exhibition. Besides these, the Metropolitan Museum of Art loaned several oil paintings which deal with the history of submarine cables.

In glass cases were cross sections of the different cables of the world, showing the variety of construction suited to the conditions of location. The thickness decreases as the cable reaches mid-ocean, from three or more inches at the shore ends to an inch in deep water, because the wear on the rocks near the shore is so much greater than in motionless depths of several miles. A part of a Siemens cable, made especially to be used in ice-bound seas, heavily armored to withstand the cutting of ice, was shown. A large case presented to the New York Electrical Society by the heirs of Cyrus W. Field had almost fifty sections of various cables in which the pioneer had an active interest.

The identical apparatus used in a famous experiment was on exhibition as a curiosity. In the demonstration of the utility of low-tension currents for the transmission of signals through submerged cables, Latimer Clarke, of England, in 1866, used a cell made of a few drops of acid in a silver thimble, weighing a grain or two at most. It was proved that by means of a cell as small as this conversation could be carried on over a stretch of 3,700 miles, giving strong deflections of the flashlight, though slower in transmission than the high-power cells, taking a full second to traverse the cable.



GUN CAP BATTERY, HALF THE ACTUAL SIZE.

In 1866 William Dickenson, an American electrician, not to be outdone by Clarke, transmitted messages from Heart's Content to Valencia, using a cell made of an ordinary gun-cap and a drop of acidulated water, as the account says, "the size of a well-formed tear." The deflections obtained by this miniature device were correctly read, though the receiver admitted that they were "awful small." In comparison with this was the tremendous power used in the operation of the 1858 cable, consisting of 380 or 420 Daniell cells, which caused its quick destruction. The little gun-cap cell referred to, which is now the property of Mr. H. H. Ward, a forty-niner of the telegraph, of East Orange, N. J., was on exhibition. Accompanying it were the following letters:

New York, April 27, 1887.

My dear Mr. Dickenson:

Some years ago Tom Scanlon sent me what he alleged to be the veritable gun-cap battery with which the cable was worked. It was a common percussion cap with a piece of wire soldered to it and a narrow strip of zinc to be inserted in it. If the history of it is correct I wish you would somewhat formally authenticate it to me, as after so many years the real article possesses some historic interest.

With kindest regards to yourself and other friends in Heart's Content, I remain,

Yours faithfully,

H. H. WARD.

William Dickenson, Esq., Electrician,
Anglo-American Tel. Co.,
Heart's Content, Newfoundland.

Heart's Content, June 19, 1887.

My Dear Ward:

Yours of 27th April re gun-cap battery: In 1866 a battery was made at Valentia station out of a lady's silver thimble, and signals sent to Heart's Content. Not to be outdone, I made a battery out of a common percussion cap. Mr. Dean, of the United States Survey, was in Heart's Content, and Dr. Gould, his colleague, was in Valentia. "V. A." was called with the usual working battery. It was removed and the gun-cap battery put in the place of it, and the following sent:

"Mr. Dean's compliments to Dr. Gould. How are you?" Ans. Dr. G. to Mr. D.—"Splendid." Clerk at V. A.—"Please increase your battery. Signs awfully small." The same battery made of the gun-cap I gave to T. D. Scanlon, I think in the summer of 1868. Trusting you are in health, I remain,

Yours sincerely,

WILLIAM DICKENSON.

New York, July 25, 1887.

Mr. Dear Scanlon:

Greeting. May you live a thousand years—or to that good old age in which your powers will all have rounded out and perfected and you are ripe for a saintly title—then you may depart in peace and be gathered to your fathers. But first—before you go—I want your "affidavit;" or, to explain more fully, you remember that you honored me long ago by presenting to me the gun-cap battery with which the cable was worked. I have it still. In the lapse of years it is beginning to be considered an interesting bit of history. In order to make its title clear I wrote lately to Dickenson, and he has verified the facts of its use and given me the message sent at that time, and stated that he gave it to you. I will be much obliged to you if you will write a paper certifying that in the year 1868—or thereabouts—you received from William Dickenson the gun-cap battery with which signals and messages had been transmitted across the Atlantic, and that you gave the battery to me. A simple letter stating the facts signed by you is all I want. With kind regards,

Yours faithfully,

H. H. WARD.

T. D. Scanlon,

St. Johns, Newfoundland.

Anglo-American Telegraph Co., Limited,
St. Johns Station Newfoundland.

August 6, 1887.

Dear Mr. Ward:

It was in 1870, I think, that I presented you with the identical gun-cap used by Mr. Dickenson when experimenting in '68 on the cables between Heart's Content and Valentia. He continued using power generated in a lady's thimble which gave strong deflections in Ireland. Water was added to the battery till nothing but water remained, and still Valentia continued to receive. Mr. Dickenson was then induced to try a still smaller cell, and a common percussion gun-cap was connected up and charged with a drop of acidulated water, resulting in complete success. The signals therefrom were distinctly read at Valentia and some messages transmitted.

Yours truly,

T. D. SCANLON.

Henry H. Ward, Esq.,

Cashier, W. U. Tel. Co., New York.

Among the interesting souvenirs was an amusing programme of an entertainment held aboard the Great Eastern. The first page announces that it is a "Cableistic and Eastern Extravaganza, by N. A. Woods and J. C. Parkinson, showing the inexplicable and vitrified adventures of a Gurnet, a Milton oyster, a Barbel, and other queer fish, being an un-Varleyized tale of a tank." The dramatic personæ include the following members of the ship's company: "Glass, a young man from the country, Mr. Dudley; Neptune, an old man

of the sea, Colonel de Bathe; Gooch—Not Daniel Lambert a Great Eastern—Mr. G. W. Elliott; Field, of the cloth of gold, Captain Bolton; a sea monster (a A-B-Sea one), Mr. H. F. Barclay; first Mermaid, poor though virtuous, Mr. Poore; second Mermaid, a vaunting female, Mr. Vaughan; several Tritons (Rightun's and Tightun's, Though Trite-un's) unavoidably absent. The captain's gig and the (gun) carriages may be ordered at any hour precisely."

The remarkable collection of bibliography of electrical knowledge was arranged in several cases, showing the famous works of the first scientists on the subject. Copies of both the first and second edition of Gilbert's *De Magnete*, published in 1600 and 1628, respectively, were in the collection. The title-page of the edition of 1600, which was the first book published on electricity, reads as follows:

Guilielmi Gilberti, Colceestrensis, Medicii Londinensis. *De Magnete, Magneticisque Corporibus, et de magno magnetice tellure, Physiologia Nova, plurimis et argumentis, et experimentis demonstrata.* Excudebat Petrus Short, Anno MDC, Londini.

Besides these there were original editions of *Cabeo*, 1629; Boyle, 1675; Ampere, 1822; Ohm, 1827; Franklin, Field, Varley and many other writers on electrical science. Many pamphlets concerning the Atlantic cable, written in the middle of the last century, deal more directly with the history of submarine telegraphy, and give a contemporary account of the first experiments.

The Telegraph in the Bahamas.

The Colonial report of the Bahama Islands for the year 1907-8, states that the revenue of the telegraph department was £1,248, and the expenditure £545. In the previous year the revenue was £1,258 and the expenditure £552. A total of 3,847 messages passed over the cable to Jupiter, Florida, where connection is made with the Western Union Telegraph Company. The total number of messages in 1906 was 3,836, and in 1905, 4,419. As regards the telephone service, there are 218 stations now in operation in Nassau and suburbs, all of which are under the direction of the superintendent of telegraph, P. H. Burns.

Miscreants for some unknown reason are trying to destroy the line of the Western Union Telegraph Company between Stanton and Newark, Del., and thus far their efforts have been so successful that a sixteen-wire pole line connecting New York and Washington has been completely put out of business for several hours at a time. Several of the poles recently were bored full of holes and then the holes were filled with oil, which was ignited and the poles burned to the ground, the wires falling with them. The damage was repaired the next day, and then the poles were sawed off close to the ground, again carrying down all the wires.

Electrical Transmission of Time Signals Without Wires.

A system for the distribution of time signals by means of Hertzian waves, invented by Franz Morawetz, of Vienna, is described in *L'Industrie Electrique*, Paris, September 10, by Dr. A. Ferla, translated by the *New York Electrical Review*. Attempts in this direction had already been made, but have failed on account of disturbances caused by extraneous waves, atmospheric and electric. The inventor conceived the idea of constructing an apparatus which remains in circuit only during one second. As soon as an electric wave strikes it, it is disconnected from the circuit by a suitable clockwork and remains in this condition for fifty-nine seconds. Thus, the apparatus is capable of receiving a signal only during one second out of sixty and can be actuated only once in a minute, either by a wave intended for this purpose, or by some other wave. Mr. Morawetz, in conjunction with Professor Reithoffer, of the Vienna Technical High School, investigated the behavior of electric waves in a large city and the construction of apparatus for their utilization. A central station was installed in 1905 on the roof of the Technical Institute in Vienna, for which the municipal council granted a subsidy of 3,000 francs, and the best form of antennæ and the most favorable wave length were studied. The experiments showed that a wave length of 765 meters had the necessary inflection to overcome the inequalities of the territory. In 1906 the influence of atmospheric electricity on the apparatus was investigated and observations were made simultaneously at two receiving stations, one at Breitensee and the other at the Siemens-Schuckert works on the Praterquai. An increase in atmospheric electricity often manifested itself hours before the formation of clouds indicating a thunder storm. An extraordinarily violent thunder storm, which struck Vienna in July, 1907, did not disturb the system in the least and proved its complete insensibility to atmospheric electricity. Although the discharges succeeded one another almost without interruption, the clocks continued to keep exact time. The waves sent out from the central station could be distinguished very clearly from the atmospheric sparks at the coherer by their color. During the trials it was likewise demonstrated that large masses of metal are no obstacle to the propagation of electric waves. The metallic cupola of the St. Charles Church is between the central and one of the receiving stations, but with the wave-length employed the signals arrived without being disturbed or weakened in the slightest. During the experiments the sending and receiving instruments were perfected. At the central station the high-tension wave transmitting apparatus is actuated by an electric clock invented by Mr. Morawetz. This clock is capable of closing the circuit of a transformer during a time-interval of either one, two, three or four seconds and from one to three times per minute.

The secondary circuit of the transformer charges a battery of one hundred Leyden jars, which is discharged across a spark-gap, producing radiating electrical oscillations in the antennæ. As the radiation cannot be produced on one side of the circuit only, the other terminal is connected to the ground. At the receiving station in Breitensee a steel tube pole, twenty meters high, is installed in a wooden socket. The antennæ consist of copper wires suspended from an insulated cross-bar at an angle of forty-five degrees. The wires are joined at the bottom, enter the station through a glass tube and are likewise connected to the ground. When the waves reach the receiving antennæ, which must be in resonance with the oscillations, a system of induction coils and condensers transmits them to the coherer, and the latter closes a local circuit by means of a very sensitive relay. The chronometric apparatus of Mr. Morawetz, the principal part of the invention, consists essentially of a clock movement which, when actuated by the waves, interrupts communication with the receiving devices, so that signals can be received only during a predetermined number of seconds. If any extraneous wave arrives at another time it operates the apparatus at the receiving station, but the wave from the central station remains ineffective. In such a case there will be a slight discrepancy between the central and receiving stations, which will, however, be compensated during the following minute and can not exceed a few fractions of a second. The secondary clocks at the receiving station may, of course, be of any construction. The advantages of this system are that the operation of the central station can be effected by a single master clock, that the installation of a great number of circuits is rendered unnecessary, and that the system may be extended without limit over a whole city, and eventually, by increasing the power at the transmitting station, over a whole country, without danger of disturbance. The cost of such an installation of clocks will be very nearly equal to that of a corresponding number of mechanical clocks, and it may be concluded that they will be the clocks of the future.

The Telegraph in Paraguay.

The British Consul at Asuncion, Paraguay, in a recent report, states that, during 1907, telegraphic communication was established between Asuncion and Villa Encarnacion. This line consists of 1,045 kilometers, or 1,208 miles of wire, and was built at a cost of about \$32,344. A cable between Asuncion and Posadas is shortly to be laid, and will thus connect Paraguay and Argentina by one single line. Telegraphic communication between the town of Bella Vista, on the Brazilian frontier, is also in course of construction, and will, when completed, unite these two countries as well. A wire from the village of Jhu to the River Parana, opposite the Jguazu Falls, is also contemplated.

Mr. Harriman Gives Wise Counsel.

Mr. E. H. Harriman, who owns and controls more railroads than any other man in the world, states that the opportunities for young men are far brighter to-day than they were forty years ago. This is an age of incomparable activity in every line of human endeavor. In the United States it calls for the driving power, the excess of vitality, that dwells in the man whose years do not number two score. There never was a time, he goes on to say, when mechanical skill, executive talent, and sheer intellect had so eager a market as now; when these qualities were so readily and steadily convertible into cash. Conditions are far easier for the young men to-day than ever before. True, the opportunities for seizing upon the natural resources of the country are not so wide as in the sixties or the seventies, but he doesn't have to wait until old age, as did his father or grandfather, to enjoy the belated harvest.

He needs make no such sacrifice as was made by nearly every man who pioneered it west of the Mississippi, nor endure such hardships. Earning a competency in thickly settled regions entails less labor and privation than in a wilderness. The main reason why so many young men look on the future with doubt is that they haven't learned to do one thing well. If you expect high wages, you must give high service. This requires thorough training and over-average aptitude, whether your vocation is sawing lumber, superintending a mine, building a bridge, or preaching sermons. In the mechanical arts, in business, and in the learned professions, you must specialize. There is no room for the Jack-of-all trades, nor for the novice, except at apprentice pay. Another reason why multitudes of young men have small hope of success is that they have never been taught, and therefore have not acquired the habit of systematic saving.

Inquire into the beginning of American fortunes, and you will find in practically every instance that it was the first thousand dollars saved that laid the foundation. Even those who afterward accumulated great wealth by questionable methods, got their start from the first thousand they laid by. And let no normal young man who has learned to do one thing well, and is free from exceptional family burdens, say he can't save a thousand dollars. He must do it if he desires independence. One excellent plan for putting by the first thousand dollars is to assume that your income has been cut down. Then save this reduction. Suppose there should come a period of depression, such as we had from 1893 to 1897, and your wages of necessity were reduced twenty per cent. Would you run away from your job and jump into the river? No.

You and all your fellow-laborers would adjust your living expenses to conform to the smaller income. Now, is it going to call for any considerable sacrifice or privation to do this? The act will involve not even a shadow of acerbity, be-

cause it is voluntary. Neither your employer nor industrial conditions enforced the reduction. After you have saved the twenty per cent. you will still be provided with all the necessities of life, many of the comforts and a few of the luxuries. If your income is \$1,000 a year, it will take you only five years to save the first thousand, assuming that the savings lie idle all the time. Unless you are a lunkhead, your earnings will be more at the end of five years and your proportion of savings much larger. By that time you ought to have acquired the habit of systematic saving, which is quite as easy as the habit of spending every cent you earn. No one is counseling you to get down to the scale of living that obtains among folk of your own station in Europe; all you are asked to do is to live rationally and comfortably.

The new sensation of a growing bank account, or ownership of a piece of productive property, together with the knowledge that you are creating for yourself your old-age pension, will more than compensate for the consciousness that you are wearing your clean and serviceable winter suit through its second season. It will enable you, without a blush, to enjoy grand opera or Shakespeare from an inexpensive seat near the ceiling. It will foster a feeling of self-respect and manliness that the spendthrift does not know. Only one young man in a hundred thousand has the combination of greed, intellect, enterprise and opportunity to become a captain of industry; but every young man endowed with health has the capacity to achieve financial independence.

Her Changing Mind.

One afternoon not long ago a young woman stepped up to the telegraph counter in a local department store and in a trembling voice asked for a supply of blanks.

She wrote a message on one blank, which she immediately tore in halves; then a second message was written out that was treated in the same way; finally a third was accomplished, and this she handed to the operator with a feverish request that it be "rushed."

When the message had gone on the wire and the sender had departed the operator read the other two for her own amusement.

The first ran: "All at an end. Have no wish to see you again."

The tenor of the second message was: "Do not write or try to see me any more."

The third was to this effect: "Come at once. Take next train if possible. Answer."

M. J. H. Dorsey, all-night chief operator of the Postal Telegraph-Cable Company, Los Angeles, Cal., writes: "The editorial, 'Further Considerations of Importance,' in your October 1 issue, was fine. Every operator in the United States ought to have it pasted in his hat."

Buying a Mine by Telegraph in Early Days.

"Old Farmer" Lawton, of the Western Union, Denver, who is not what could be termed a wealthy man, has, by prudent investments, saved up a competency in the shape of a good farm and other property. "I managed it," he said, "simply by watching how successful men handle their affairs and not trying to imitate those that plunge.

"It's amusing," he said, "to see how impatient some people become over other people's affairs. Only yesterday I overheard a resident of this city remark about the apparent slowness in the construction of the Moffat road. While that gentleman has lived in Colorado for many years and has made and lost two or three fortunes in mines, he has evidently never watched the successful careers of the men who are opening up one of the richest sections of the state with a railroad whose engineers are constructing the road so substantial that it calls for the most flattering words from the greatest railroad builders in the country.

"Take D. H. Moffat, who is pushing this great enterprise that is soon to bring the undeveloped portion of northern Colorado, southern Wyoming and northeastern Utah into communication with the outside world. Did you ever know Mr. Moffat to do anything on the spur of the moment? Has he not been forty years in building up one of the greatest banking houses of the country? Were it not giving up the secrets of the telegraph I could tell you exactly how it was accomplished. However, one little instance occurred back in 1879, of a verbal nature, no records having been kept, and of which I can speak.

"Mr. Moffat had become half owner in the Little Pittsburg mine in Leadville, in partnership with H. A. W. Tabor. The soft carbonates were being hoisted out of that one mine at the rate of over \$1,000,000 a year. It made Mr. Tabor a millionaire, but it did not worry Mr. Moffat in the least, and he continued running his business affairs just as carefully as before the profits of his half of this wonderful mine began coming in.

"In those days the telephone was not in practical use. Mr. Moffat wished to talk to Leadville and asked our superintendent if he could let him have an operator to translate the dots and dashes into plain English for a few evenings after our office was closed for the night. As I was the only operator out of the four or five, then employed here, that could not dance, the superintendent instructed me to come around evenings and get Mr. Moffat in touch with his Leadville people. The first evening that we made the connection Mr. Moffat was informed by his Leadville partner that one John Taylor had struck a vein very much resembling that in the Little Pittsburg upon adjoining property, that Taylor was calling it the New Discovery, and which he would sell for \$30,000 cash. Would Mr. Moffat buy? No, not until he knew what he was buying. The next evening the electric

current brought the information to Mr. Moffat that Taylor had raised his price to \$40,000 and that there was some chance that the vein in the New Discovery would crop over into the Little Pittsburg. Would Mr. Moffat accept the raise in price and take the property before it went higher? No, not until he was certain what he was putting his money into.

"The next evening Mr. Moffat received the startling information that a Chicago syndicate was negotiating for the New Discovery, and had an expert upon the ground, and that Taylor had jumped his price another ten thousand. Before Mr. Moffat could be asked if he would go in and take over the new property, he coolly replied, if the Chicago syndicate are surer of what they are buying than we are, let them have it. This new state of ours is in need of eastern capital; and the evening's conversation ended. However, it was renewed the next and the next evening until finally Taylor had the price up to \$115,000. By this time Mr. Moffat had the necessary assays made and Mr. Tabor reported \$150,000 worth of ore in sight in the New Discovery with the ore body increasing in size. It was then that Mr. Moffat verbally told me to tell Mr. Tabor over the wire that he could offer Taylor \$125,000 for the mine, which Taylor accepted—and then tried to spend it all in a month.

"That night, after the sale was closed, Mr. Moffat turned to Mr. George Kassler, his cashier, who had been accompanying him to the telegraph office, and said: 'George, I am glad that we have settled this little deal, so that we both can spend our evenings at home, and I feel better satisfied in paying Taylor \$125,000 for his property now than to have purchased it for \$30,000 before knowing the extent and value of its ore body.' The newly-acquired property proved a great producer, and up to April, 1880, a little over a year, had netted them exactly \$2,697,534.91.

"In my opinion Mr. Moffat is building his railroad after the same cautious and deliberate, businesslike way in which he invested in mines and has since conducted his other business, and when the road is completed and the greatest coal beds and mineral deposits in the state are tapped and when stock can be shipped direct to the markets, instead of being driven eighty to one hundred and fifty miles to the nearest railroad station, then those men who put their money in with Mr. Moffat in this great undertaking will find that his road that has paid from the start will be paying even better when completed and that branches and feeders will be built just as fast as Mr. Moffat's judgment dictates.

"When Mr. Moffat was president of the Denver and Rio Grande Railroad, nearly twenty years ago, the foreign stockholders of that company never hesitated in building a new line that Mr. Moffat saw fit to recommend, and the new lines built under his management have since proved the best paying ones now owned by that great system."—Denver Republican.

Ben's Initiation.

BY J. P. WILLIAMS.

Hazing the newcomer is an established custom in every railroad dispatcher's office and is looked forward to with keen delight by those who have attained the required degree, particularly if the new arrival is from the commercial ranks. Of course, the matter handled by railroad operators is of different character than that which forms the daily work of the so-called commercial telegraph operator. Train orders, freight reports, combinations and abbreviations describing lading manifests, etc., are so numerous that the average telegraph operator in entering the railroad service practically begins a new course in the art of telegraphy.

I have a vivid recollection of the entrance of "Ben" Howard in the service of the Pennsylvania Railroad. Many old railroad operators will remember "F" office, the dispatcher's headquarters of the Philadelphia division, on the second floor of the old building in West Philadelphia, at one time the main depot of the Pennsylvania Railroad in that city. Here, at the time of which I write, centered the junction of four divisions, all trains from junction passing in over a four-track road to the new depot at Broad and Market streets, known to all travelers as the Broad Street Station. After entering this section trains were considered to be in the "yard" and were handled by the yardmaster, the train dispatchers relinquishing jurisdiction as the train passed a small signal station just east of "F" office and toward Broad street. The train sheets recording the passage of all trains entering this section, however, were required to be kept at "F" and these sheets, broad and important in their aspect, covered an easel-like shelf placed above the two instruments connecting "F" office with the Broad Street Station. These wires were used not to direct the movements of trains, but for the purpose of answering queries relative to the position of trains on the various divisions. This desk the boys always referred to as the "gut" and was the one to which the newcomer was invariably assigned. "Ben" Howard took up his duties on this wire in a rather sulky mood. He had been placed on the roll by Division Operator Fondersmith two days previous, and his experience had been anything but pleasant to him. His probation up to this time had been spent in receiving all sorts of queer messages which, however, seemed to be received and passed up in the regular manner without comment or return. An hour after he had donned his office coat on the first day, he had answered the call for "F" and had received the following message: "To Superintendent Gucker: Please send a 40,000 pound capacity locomotive to load ice." It sounded strange to Ben, but everything in the place was strange. A few more such messages throughout the day increased his misgivings. Ben, however, was on hand at the appointed hour on the sec-

ond day. Answering a call on the Westchester wire, the instrument ticked off the following:

"To F. F. G.: Barnum's Circus loads at this siding to-morrow. Please send thirty flat cars to load elephants. The giraffes go in Eastman steam-heaters. Do you regard it as necessary to place men on top of the cars to have the animals duck as we approach tunnels? Please reply." This was a bit too much for Ben; he opened his key and looked around the room. All hands seemed to be busily engaged with their respective duties, but a gleeful chuckle revealed the face of "Smiling Sam" Graham, located back of the switchboard, instrument in hand and the "fake" message before him. A general laugh followed, in which Howard, a youth of twenty-two, and really a fine fellow, subsequently becoming an expert railroad operator, seemed to join.

The following morning found the new man assigned to the "gut." It should be explained here that all trains are known to railroad men by other designations than by their schedule number. There is the "Flying Dutchman," "The Limited," "The Cannon Ball," etc. One train on the Pennsylvania Railroad, known far and wide at that time as the "Tub," was an old-timer, having made daily trips from end to end of the Philadelphia division for many years. She stopped at all stations, taking a package here, leaving one there and from the variety and general nature of the contents of her baggage car was called the "tub."

Operator Howard had been on his new assignment about one hour when "Ps," the Broad street office, called "F," and receiving the customary response, inquired, "How's the Tub?" meaning, of course, to inquire whether old No. 16 was on time or how much of the hour late. Howard scowled darkly at the instrument and made no response. A repetition of the inquiry caused a deeper frown and a mental determination to "quit this business and go back to straight stuff." Finally the "Ps" operator reported to the stationmaster his inability to obtain an answer from the man at "F."

The stationmaster, himself an operator, who had graduated from the key, came to the wire and ordered his assistant to repeat the inquiry. He did so.

Ben Howard suddenly threw back the lever of his key, grasped the instrument tightly and with many rapid motions, said things which reflected seriously on the antecedents of the stationmaster, that individual himself, and the road in general. A moment later the telephone bell rang in the superintendent's office, that gentleman hurried to Dispatcher Fondersmith, and explanations followed rapidly. Operator Howard was given leave for the day with pay.

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

The Military Telegrapher in the Civil War.

PART IX.

Deviating from the publication of letters written by military telegraphers thirty years and more ago, to Colonel William R. Plum, the historian of the United States Military Telegraph Corps, we break the series temporarily to print the following received from Thomas H. Brooke, of El Reno, Oklahoma, recounting his experiences as a military telegrapher in the Civil War, the writing of which has been stimulated by the letters of like character he has read in these columns:

Early in March, 1863, I reported to Captain Samuel Bruch, superintendent of the United States Military Telegraph Corps, at Louisville, Ky., for duty as an operator. I was sent to Columbia, Ky., where the Ninth Kentucky Cavalry was then encamped. The cavalry was soon withdrawn, leaving me in charge with a lineman and secret service man or spy, to keep up correspondence with the department at Louisville as to movements of General John Morgan. The lineman took up his abode in the country, where he would be least exposed to raiding parties from Morgan's camp. The spy or scout was very daring in his movements. He was employed by a farmer and worked on the farm near Morgan's camp. When occasion afforded he would come to Columbia and pass his report to me secretly, which I usually reported in cipher to the department at Louisville.

It was no unusual thing for George A. Ellsworth, Morgan's operator, to cut in on our line, and for us to find the line cut and twisted around trees in a manner rendering it worthless.

An operator by the name of George Purdon was at Lebanon, Ky., during this period, and he and I had private signals for tests in case of suspicion when any important matter was pending. I would say "sign;" his answer would be "P;" again I would say "sign;" his answer the second time being "N;" once again I would use the word "sign," to which his answer would be "Nodrup." The letters used were the last and first of his name, the final word being his name spelled backwards. His test for me in like manner was: "Sign," "B;" "sign," "E;" "sign," "Ekoorb."

The signals worked like a charm. Mr. Ellsworth cut in, called me up, asked what was latest from Morgan, and signed "P." I said "sign." He responded "P." "Sign," I demanded. He responded "P. You d— fool, what's the matter with you." We scrapped a little, and he said he was coming after me himself this time and would get me and would make it d— rough for me. He said the boys that had been after me the two or three times before were no good. I assured him in the name of Uncle Sam that if he ever cut our wire again I would have him sent to "Camp Chase."

Several detachments raided Columbia at in-

tervals after that time. My office was located on the second floor of a building with only a front stairway for exit. When the cavalry would charge into the town I always heard them and usually dared not use the stairs in effecting an escape, as I would meet the enemy at close quarters with a likelihood of being captured, but would climb out of the back window, letting myself down as far as I could reach, then let go and drop to the ground. A six-foot board fence enclosed the back yard. As soon as I could cross the fence I was protected from view and could make good my escape. On one occasion the rebels had reached the front steps just as I left the window. As I was about to vault the fence I was commanded to halt, the order being accompanied by a volley of shots. I scarcely touched hand or foot to that fence, but was over it in an instant and soon reached a clump of timber and underbrush, in which I found a secure hiding-place, although diligent search was made for me. One man, indeed, rode within six feet of me. I looked him square in the face. He had his gun cocked and finger on the trigger, but rode on. I saw others searching closely. Finally they gave it up.

On July 3, 1863, the whole force of the enemy moved into Columbia about noon. I had anticipated the date of their coming pretty closely and was on the alert, and made my escape on a good horse. But my capture was evidently determined upon, and ascertaining the direction I had taken, I was followed closely. A ride of a few miles brought me to the "Devil's Elbow," a point where the road curved around a great canyon in the mountain, following which would bring me back close to the advance of my pursuers. I hesitated whether to chance the shots they would take at me if discovered, as I was almost sure to be, or to leave my horse and take to the woods and so endeavor to get away. My intention was, if possible, to reach Green River bridge, where two Union regiments were stationed, guarding a ford on the road to Lebanon. If I could reach them they would be prepared to meet attack. They could not be communicated with by wire. I determined to take my chances by keeping to the road, and lying as flat on the horse as possible, I urged him to a swift pace. As I reached a clear spot in the road where no timber shielded me from view I was observed, as expected, and a volley of lead was sent after me. Bullets whistled all around me, but, fortunately did not touch either horse or rider. Almost instantly I was again hid from view by the intervening timber. I reached Green River safely and notified the troops of Morgan's approach, with the result that immediate preparations for defense were made. Attack was deferred until the dawn of July 4, but owing to the entrenchments hastily devised and the superior advantages of position, those two regiments were not only enabled to hold their position, but forced Morgan to cross the river to his great disadvantage.

An advance from Morgan's force, however, succeeded in crossing the river at some point during the night, accompanied by Operator Ellsworth, and a point on the railroad between Lebanon and Louisville was reached. Ellsworth cut in on the wire, and, using the name of Purdon, the operator at Lebanon, invited one of the Louisville operators to come and spend the 4th of July with him and have a good time. The operator boarded a train, later to find his train ditched near Lebanon Junction and himself and passengers robbed of everything of value about their persons, delivered up at the muzzle of loaded guns in the hands of these guerrillas.

After reaching Green River ford July 3, I fully anticipated the capture of our troops stationed there and determined to press on to Lebanon at early dawn of the next day. Accordingly I crossed the river before nightfall and sought lodging in a cabin near the ford. I was made welcome by the inmates, who informed me that they were Union people. They feared to remain, and at once, under the circumstances as explained by me, started for the woods, taking some rations with them, leaving my breakfast and a little bottle of tanzy bitters. I retired for needed rest and slept until awakened by shot and shell and shouts at daybreak. Securing the food left for me, I locked the door and laid the key over the door of the log house as I had been directed, and hastily left for Lebanon. I could not communicate with that point by wire and did not have time to advise regarding the movements of Morgan before leaving Columbia. My hope was to reach Lebanon in advance of the Confederate force.

I reached Lebanon and reported the condition of things to the commanding officer and likewise to the department at Louisville. Reinforcements were ordered from Danville to Lebanon, but through their own negligence failed to reach their destination until after our forces were captured and much of the town burned by Morgan, the attack having been made at daybreak July 5.

Fearing the result of the weak force at Lebanon in an attempt to hold its position, I requested to be passed through our picket lines, which, being granted, by daybreak I had made my way to a high elevation near the city. After it had become light enough I could see every move of the engagement, buildings fired and prisoners killed, until Morgan's force began moving on the Powder River road. I then determined to go to Danville. I had turned over my horse at Lebanon and was afoot. After breakfasting on luscious blackberries picked from the bushes, I hurried on, traveling three or four miles, when I discovered a troop of cavalry camped by the roadside. Approaching carefully, I observed they were all in federal uniform. The soldiers proved to be two regiments of Michigan cavalry, which had been ordered to reinforce Lebanon, and had failed to reach there in time. I told the story of the fate of that town. After my information was given there was a quick mount and an advance made towards the Powder River road.

Reaching a high point, Morgan's men could be seen in the distance. The artillery was got in position and a few shells were thrown so close to the retreating raiders as to cause quite a commotion among them and to accelerate their movement. Our men returned to Danville and I with them.

Before leaving Lebanon I said to Operator Purdon that the troops there could not stand against Morgan's heavy force, and I expressed the fear that he would get the worst of it. He said he was pretty good on the run and would chance his luck, as, of course, he must, as everything was then dependent upon him as the only operator in charge. He was a brave boy and deserved much credit, for he narrowly escaped with his life by hiding while his fellows were being murdered at the hands of the guerrillas, who had taken them prisoners.

I was ordered to report to Captain J. C. Van Duzer, superintendent of the United States Military Telegraph at Nashville, Tenn. He stationed me at Murfreesboro, where I had Joseph M. Humphreys, John Chittenden and others as comrades whose names I cannot now recall. I arrived there just after the battle on Stone River and remained until after the Army of the Cumberland had moved to Chattanooga. I was scarcely able for light duty at the time the army moved, and was accordingly sent to Fosterville, where two companies of infantry were doing guard duty. There I remained until November, 1863, when General Joe Wheeler made a raid northward and cut wires to the south of me in a dense pine thicket one or two miles distant. A section foreman discovered the condition of the wire and hurried to the office, saying that horse tracks indicated that a cavalry troop had destroyed the line for half a mile in length. He refused to take his negroes and go back and repair the line so I could report to army headquarters south as to the cavalry movement. The section foreman explained that he was not yet ready to hang on a pine tree, which would be the result if caught repairing the line with "niggers." The gang heard what he said and did not seem to be inclined to go either. I told him that I would take his men and repair the wire and he could remain behind. The men hung back, but after a little cussing from the boss, they got aboard under my charge. When we reached the pine thicket I almost wished I had not ventured. I said: "Men, if you ever worked fast, do it now." They were certainly scared, and I never saw men jump into work so lively. The breaks were repaired and we were soon back and reported Wheeler's army as having moved north at daylight on the pike, which was one mile distant from Fosterville.

(To be continued.)

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Western Representative: **WATSON INSULATED WIRE CO., Railway Exchange, CHICAGO, ILL.**

The Railroad.

Mr. M. E. Launbranch, engineer salesman for the Western Electric Company, New York, for many years past, has resigned to accept the management of the Chicago office, which is located in the Monadnock Building, of the United States Electric Company of New York, manufacturers of the Gill selector.

Mr. H. C. Hope, of St. Paul, Minn, superintendent of telegraph of the Chicago, St. Paul, Minneapolis and Omaha Railway, was a recent New York visitor. Mr. Hope attended the annual meeting of the Railway Signal Association at Washington, D. C., on October 13. Mr. Hope was accompanied by his daughter, Miss Nellie Hope. During his stay in town he called on Thomas A. Edison in company with L. B. Foley, superintendent of telegraph of the Delaware, Lackawanna and Western Railway.

Albert Hayward, aged seventy-seven years, for over thirty years superintendent of telegraph of the Ohio and Mississippi Railroad and its successor, the Baltimore and Ohio Southwestern system, died at Cincinnati, O., on October 5, as a result of a stroke of apoplexy, from which he suffered for over a year. He was a native of Rutland, Vt., where he taught school during his early life and later resumed his profession at Olney, Ill. He studied law in Olney and was later admitted to the bar, but instead of practicing law became a telegraph operator at that point. In 1871 he was appointed superintendent of telegraph for the Ohio and Mississippi, and was continuously in the service of that company and its successor, the Baltimore and Ohio Southwestern, until his retirement, a few years ago.

Annual Meeting of the Railway Signal Association.

The Railway Signal Association with a membership now over eleven hundred, and with forty-three roads represented in the membership officially, is gradually becoming a strong organization, says the Railroad Age Gazette. By the amendments to the constitution, adopted at Washington at the meeting held October 13, 14 and 15, its dignity and usefulness will be increased. The amendment reducing the number of meetings to three in each year, instead of five as hitherto, will promote efficiency by preventing much waste of energy. The annual meeting is on the second Tuesday in October, and there will be one meeting in Chicago on the Monday before the third Tuesday of March, and one in New York on the second Tuesday of May. There was considerable sentiment in favor of having the May meeting come three or four weeks later, and it is possible that the executive committee, which has the necessary power, will change this date. That the specifications for different kinds of signal work, which have been adopted are important, is evidenced by the pronounced demand for them, which continues in spite of admitted deficiencies

in most of the codes. The harmonizing of the different codes, which will probably be done this coming year, will no doubt greatly improve all of them. The action of the association in defining signal aspects and simplifying the code of aspects seems destined to greatly improve practice throughout the country, albeit there is a great wall of conservatism yet to be broken through. Hitherto most of the association's good work has been in connection with construction rather than design, with details rather than broad policy; but now it has opportunity to fill a larger and more important field. Under President A. H. Rudd it has made a good beginning toward taking a position of influence with managing officers; and this progress, we may confidently assume, will be kept up. The signal engineers of the country should not only tell their employers how to make and manage their signals, but also should have a more influential voice as to what to adopt, and how fast to turn the wheels of progress.

The association voted to hold the next annual meeting at Louisville, Ky. The election of officers for the ensuing year resulted as follows: President, L. R. Clausen, superintendent of the Chicago and Milwaukee division of the Chicago, Milwaukee and St. Paul Railway, Chicago; second vice-president, C. E. Denney, Lake Shore and Michigan Southern, Cleveland, Ohio; (the first vice-president is H. S. Balliet, New York Central, New York, who holds over); secretary-treasurer, C. C. Rosenberg, Bethlehem, Pa.; members of executive committee, C. C. Anthony, Pennsylvania Railroad, Philadelphia; J. C. Young, Union Pacific, Omaha.

Telephone Despatching on the Canadian Pacific Railway.

A trial telephone despatching circuit was equipped on the Canadian Pacific Railway between Montreal and Farnham, Que., forty-four miles, and put into operation on June 23, since which time no despatching has been done by telegraph between those points with the exception of two occasions when some of the instruments were injured by lightning. Two special hard-drawn copper wires, weighing 210 pounds a mile, were strung. These wires were transposed every quarter mile between Montreal and Montreal Junction, and every half mile for the remainder of the distance. The circuit is now being extended from Farnham to Newport, Vt., sixty-four miles further. It is the intention, says W. J. Camp, the electrical engineer of the Canadian Pacific Railway's Telegraphs, to transpose every half mile between Farnham and Newport, with the exception of a few miles where a high-tension power line is paralleled. Along this portion the wires will be transposed every quarter of a mile. The double transposition insulator is not used, the two wires being usually strung on the end pins of two crossarms, one wire above the other. Where transposition takes place an extra pin is inserted in the upper arm to carry the wire that would otherwise be on the bottom

arm; the upper wire then drops to the bottom arm on the next pole. By following this method there is no part of the line where the two wires are nearer each other than seven inches, thus avoiding leakage across from wet weather, wet snow, etc., and also liability of crosses resulting from a transposition insulator being broken. The transposition insulator being larger than the remainder on the same pole, the small boy and others are likely to use it as an objective when throwing stones.

The telephone system has been found very satisfactory and, as stated, the circuit is being extended from Farnham to Newport. Estimates have been prepared for two other circuits on western lines, where it will probably be introduced next year. It was at first presumed that while the telephone would likely be found very advantageous in working double track, it would not be nearly so good for single track service, but actual experience has shown that the advantages of the telephone over the telegraph are far greater for single track work than for double track.

Not only is there a very great saving of time in handling traffic, but there are many additional advantages; for instance, the despatcher is able to call the conductor or engineer to the telephone at any station and converse with him directly about any difficulty that may have arisen. He can also get far more definite information in a much shorter time from the operators or agents regarding any matter connected with the despatcher's department. In addition to these advantages, each train can be equipped with an instrument and a jointed pole by which, in case of a train being stalled between stations, the conductor can in one or two minutes get into direct communication with the despatcher. The trains on the Montreal-Farnham section have not yet been equipped, but they probably will be in the near future.—*Railway and Marine World*.

Some Interesting Statistics Relative to the Association of Railway Telegraph Superintendents.

The convention of the Railway Telegraph Superintendents, held at Montreal, in June last, was so successful a meeting that a few statistics respecting the same will be of interest.

Out of a total of ninety-two active members there were present fifty-five, or sixty per cent. Of thirty-seven associate members there were present twenty-seven, or seventy-three per cent. Of one hundred and twenty-nine paying members (that is, active and associate combined) there were eighty-two present, or nearly sixty-four per cent. This is probably a much better showing than that of any other organization of a similar character, and demonstrates the very great interest taken in the subjects that were brought before the association. In addition to the foregoing enumeration there were present four honorary members and eighty-three visitors, includ-

ing ladies accompanying the members, making a grand total of two hundred and twelve persons registered.

There were twenty-five active members and eighteen associate members who joined the association at this meeting (eight active and two associate being from Canada), a net gain over the preceding year of seventeen active and twelve associate members. There were three active members elected to honorary membership, and five who lapsed.

Another indication of the business-like character of this organization is the fact that although a trolley ride through the city and around the mountain was provided for, the active members unanimously voted to continue in session and allow the associates to escort the ladies during the afternoon.

Grand Trunk Pacific Telegraph Company.

Few people realize the extent and importance of railway development in Canada. In connection therewith the telegraph is keeping pace—auxiliary agents, each advancing with the other.

The Grand Trunk Pacific Railway Company is constructing a transcontinental railway and telegraph system, extending from the Atlantic to the Pacific Ocean, wholly within Canadian territory, with a total mileage, main line and branches, of approximately 9,000 miles. The western terminus of the road will be at Prince Rupert, British Columbia, where a magnificent harbor is available. Prince Rupert is two days nearer the Orient than any other port on the Pacific Coast. The Grand Trunk Pacific Railway Company is closely allied with the Dominion Government, and the Grand Trunk Railway system of Canada.

The Grand Trunk Pacific Telegraph Company is incorporated under special act of Dominion Parliament, with a capital of \$5,000,000. Telegraph construction is now proceeding simultaneously along the entire route, and it is expected that the railway and telegraph systems will be completed from ocean to ocean by 1911. It is also the intention of the telegraph company to extend its system to all points in Canada, where it will prove an active competitor for public business. On September 21, last, the company opened its lines for public service, extending to all offices through the rich fertile provinces of Manitoba, Saskatchewan, and Alberta and further extensions will be made in the very near future.

Chas. M. Hayes is president; Frank W. Morse, vice-president, and A. Bruce Smith, general manager, all of Montreal, Que.

Extravagance.

The following telegraph money order was received by the postmaster of a popular English seaside resort, says *St. Martin's Le Grand*:

"Pay D. J. V. — — — four pence. Penny for shave; penny for cigarettes; two pence for entrance to pier."

This is probably a record amount sent by telegraph.

Train Despatching by Telephone.

BY G. W. DAILEY.

Superintendent of Telegraph of the Chicago and Northwestern Railway Company.

(From the Northwestern Bulletin.)

The yard telephone systems of the Chicago and North Western Railway Company have been in successful existence for years. The errors and misunderstandings have been so few and the operation of these yard lines so successful that it had quite a bearing upon the determination to extend the use of the telephone in our service.

The next step was taken last year, when we equipped the following districts with telephones for blocking trains: Madison Division—Harvard to Elroy, and Milwaukee to Montfort; Wisconsin Division—Milwaukee to Fond du Lac; and Iowa Division—Boone to Missouri Valley. The telegraph block instruments were taken out, telephones installed on the block wires, and all blocking done telephonically since then. It has proved entirely satisfactory in every particular, and it will be noted that these districts embrace both single and double track with heavy traffic. This year we equipped the Madison Division—Janesville to Baraboo (in operation May 31), and the Wisconsin Division—Chicago to Janesville (in operation July 1), with train despatcher's telephone lines, and are now completing line, Baraboo to Winona.

The standard of installation and use is alike on the two divisions, and one illustration or example will cover all. The very best wire, instruments and other material have been used, and the best workmen obtainable to install them. The line is metallic circuit, that is, two copper wires, No. 9 B. & S. gage, weighing 210 pounds per mile, transposed every one-fourth mile to eliminate induction and outside electrical interference. The circuit is self-contained, that is, the signaling and talking is all done on the same pair of wires, and one does not interfere with the other. The calling is done as follows: In the despatcher's office is located a box about twelve inches high, eighteen inches long and three inches deep, with a row of push buttons across its face. Inside the box is a clock and three small relays or magnets, all connected. Each push button corresponds to a certain station. Each station is equipped with a box containing a clock, two relays, two coils, four cells of dry battery and a four-inch vibrating bell, which can be heard a considerable distance, even out on platform. The despatcher desiring, say, four stations, presses the push buttons in his box corresponding to the stations, then presses a battery button in the lower middle face of box, and the bells in these particular stations ring until shut off by the operator. They make such a racket that he is usually prompt in shutting them off and answering. By this method as many as twenty-eight stations can be called in thirty seconds. This calling being practically in-

stantaneous, it can plainly be seen that a great saving in time is effected over the old plan of calling by the telegraph key, when it was a common occurrence to waste from fifteen minutes to an hour, calling one office. If an agent or operator is in the freight room or out on the platform unloading freight, he can hear his bell, and we have had cases where others have heard the bell and called the agent when he was out of hearing. The result is that there is practically no time wasted calling offices, which conserves the time of the despatcher and enables him to utilize such time in other more profitable ways. So much for the calling arrangement.

For talking purposes the train despatcher has a breast transmitter and a cap receiver, which leaves both hands free. Each station is equipped with a swinging arm transmitter, which can be moved into any desired position, and a cap receiver, thus allowing both hands to be perfectly free while using the telephone.

The train despatchers' circuit is for the exclusive use of the despatcher in handling trains, and no other business is transacted over it, except as he may direct. The despatcher is cut in on circuit at all times, but stations are not. It is not necessary for way stations to ring the despatcher; all they need to do is to take down the receiver and pronounce the name of their station. If the line is busy when they take the receiver off, they simply wait until it is clear. Stations desiring to communicate with each other must request the despatcher to call the other offices for them, as they cannot do so themselves. This is so arranged in order to give the despatcher entire control of the use of the line. A secondary circuit has been established for emergency use, by transposing two iron telegraph wires. They, as well as the copper pair, are cut into switchboards at every third or fourth office and equipped with hand-throw switches. If any trouble comes in on the copper pair, for instances, between Barrington and Crystal Lake, the despatcher locating same between these offices directs those two offices to cut in the emergency iron pair at each place. One movement of the switch does this, and the line is again ready for use. When trouble has been cleared the lines are restored to normal. The transposed pair of iron wires are, of course, used for telegraph work when not patched into the copper pair. Even then they can be used either side of the patch. One movement of the switch cuts out both telegraph and telephone at any station, and this is done when leaving the office for any length of time or when closing for the night.

In handling train orders by telephone it should be remembered that all rules and regulations governing train movement remain the same as under the telegraph. No rules or practices have been changed, and everything that has been done is still done, the only difference being that they talk instead of work a telegraph key. The orders as delivered to conductors and engineers are just the

same in form, appearance and every particular as they have been and are handled exactly the same as heretofore. In issuing a train order, the despatcher, after calling the stations he wants, proceeds with his order in the same form and formula as if by telegraph. The names of all stations, conductors, train and engine numbers and time are first pronounced plainly, then spelled out letter by letter and figures duplicated, naming each figure separately. When speaking the order the despatcher is writing it in his record book, which is quite a material safeguard over the telegraph practice. When he is done speaking he is done writing and ready for the repeating by the operators. This reduces his speed of conversation to his own ability to write it down and also gages the speed for the receiving operator out on the line and does not hurry him unnecessarily. The operators repeat the orders back to the despatcher in the same way, giving "X" acknowledgement, etc., same as ever. All operators concerned listen to each other repeat, thereby checking each other. The despatcher underscores each word and figure in his record book as it is being repeated by each operator. Following are two illustrations of orders; the hyphenated words and figures being spelled out letter by letter. The orders as delivered do not show these spacings or brackets, which are merely used for this illustration:

Example I.
Order No. 49.

To C. & E. No. F-i-f-t-y F-i-v-e (Five Five):

Extra E-l-e-v-e-n S-i-x-t-y S-i-x (Double One Double Six) and No. F-i-f-t-y F-i-v-e (Five Five) Engine S-e-v-e-n (Seven) J-o-n-e-s will meet at Bombay (B-o-m-b-a-y) instead of Bangor (B-a-n-g-o-r).

Example II.

No. T-w-e-n-t-y T-w-o (Double Two) Engine S-e-v-e-n-t-y S-e-v-e-n (Double Seven) S-m-i-t-h will meet No. T-h-i-r-t-y F-i-v-e (Three Five) J-o-n-e-s at Bangor (B-a-n-g-o-r).

In reporting trains to despatcher, (3s) no calling is necessary, the operator merely takes receiver off the hook, speaks the name of their station, and goes ahead with their business; the despatcher being cut in continuously, hears them, gives his acknowledgment, etc., and the transaction is completed. The despatcher writes his order in his record book as he speaks it, and so is all ready for the repeat when he is through speaking. The operators can then talk it back to him as fast as they can do so distinctly and plainly. The result is that counting the time saved in calling and the quicker repetitions we find that orders and 3s are handled about fifty per cent. quicker than by telegraph. This means that the despatcher can dispose of his work that much faster, has more time to figure out movements, meeting points, etc., and can handle a great many more trains on his trick and handle them more promptly, thereby greatly facilitating train movements. It further places the despatcher in closer touch with

all the little details of his daily work and in closer touch with his men out on the line.

It has been our observation that there has been a decided improvement in the work and deportment of the men out on the line, due to the fact that the conversations between the despatchers or other employes are of a much more personal character than obtained by telegraph, resulting in closer working relations and more pleasant co-operation. It is more as if they were facing each other and they don't feel like indulging in some of the choice remarks that used to fly over the telegraph wire when someone would lose his temper. A cross-grained man don't feel as brave and cocky when he is talking directly to you. We have had instances where derailments or other accidents have occurred, and the despatcher being able to converse directly with the conductor on the ground and the conductor being able to explain things in his own way, more has been accomplished in ten minutes than could be done by telegraph in an hour under the same conditions.

Each superintendent has a telephone on his desk connected with the despatching line. He can listen in, or talk with any or all his stations at any time. He can himself check up any slackness and keep in personal touch with everything, which was not possible telegraphically, unless the superintendent was a telegrapher, and this is not always the case.

It has opened up an avenue for employment for injured trainmen and other employes, who make first-class block operators or station agents, being experienced and much more desirable and reliable than some strange operator that might come along or some young fellow starting in. It should likewise open up a future avenue for bright young conductors to become train despatchers should they so desire. There are many young conductors who ought to make first-class train despatchers, and under telephone operation it would be a comparatively easy matter for them to do so, as they usually have the necessary experience and all the requirements, except the ability to telegraph. The train despatchers are all enthusiastic over the telephone and appreciate it, as it lightens their many burdens to a considerable extent, and we all know they have burdens enough to carry.

There are many other advantages connected with the use of the telephone for train despatching, and it is decidedly a step in advance in the method of handling trains. More trains can be handled in a given time, prompter movements can be made, emergencies handled and controlled quicker and better. All are placed in closer touch each with the other, and the method is just as safe as the telegraph for such purposes. When telegraph orders were first introduced, the first train and engine men handling them were afraid of them and did not want to use them. Now we would not do without them. It was a great advance over running by smoke and time

card. * * * The change from telegraph to telephone operation on the two divisions mentioned was made without a hitch. All the officers and men concerned are entitled to a great deal of credit for the willing and efficient manner in which they took hold of the matter.

There is an erroneous impression that the telephone may soon supersede and replace the telegraph entirely. This will not happen in your time or mine. On the two districts equipped, while we are using the telephone for train movement business, we have retained the telegraph for ordinary messages and commercial business, and intend to retain the telegraph for such purposes.

Business Notices.

The Central Electric Company, Chicago, Ill., are distributing new price lists on Columbia low-voltage tungsten miniature lamps for battery service. The introduction of the miniature tungsten lamps is of highest importance to those having occasion to use battery lamps and in anticipation of the demand, the Central Electric Company has accumulated a heavy Chicago stock. These circulars and price lists will be sent to any address upon application.

The Hartman Furniture and Carpet Company, of Chicago, one of the largest concerns in this country selling goods on credit, with an extended mail-order business, has reached this point of magnitude in their dealings largely through the wide distribution of their catalogue No. 55, which is a marvel of completeness. In it are shown hundreds of styles of furniture, carpets, rugs and household furnishings, illustrated from actual photographs, and showing the article just as it is. Rugs and carpets are photographed in the original colorings and patterns. It is the same as seeing the articles in the showroom—makes shopping by mail a delight. This catalogue may be obtained on application. Address the main store, 223 to 229 Wabash avenue, Chicago, Ill.

The Railroad Supply Company, of Chicago, are inviting attention to their style F lightning arrester. This arrester is designed on the well-known principle that lightning will discharge more readily from points than from flat surfaces, and that the greater the number of points and the smaller the air gap between the points and "ground," the more sure lightning will discharge at this air gap. This instrument has a large carrying capacity and does not introduce resistance or impedance in line. It can be connected in series or multiple with line. It is furnished with or without fuse of any capacity. An accidental or intentional short circuit in the arrester will not interfere with the proper working of signals, telephones, telegraph or other devices, and it may be taken apart for inspection while in service without opening or grounding circuit. It is entirely machine and die made, all parts interchangeable, and is furnished on porcelain or slate bases.

The Kellogg Switchboard and Supply Company, of Chicago, have recently issued a folder

describing their new push-button intercommunicating telephone system. Five views showing wall and desk set styles, both open and closed, are given. The illustration shows it to be one of the most compact, private, automatic house systems on the market. Being compact, it is necessarily simple in operation. The accessibility and rigidity of these sets are clearly shown in the illustrations of open views. Both styles, wall and desk sets, are easily handled, and attractive in appearance. They are finished in either oak or mahogany, and do not detract from the appearance of any office or room, because of the high grade of the cabinet work for which all Kellogg apparatus is noted. The desk-set box takes up little room, and can be used either movably or placed in any convenient position on a desk or table. The company will be glad to answer any inquiries and to send these folders to those interested, and will also, if requested, forward original photographs which give accurate views of both styles and sizes.

The Twenty-fifth Anniversary Number of Telegraph Age.

The constant call, frequently preceded by the inquiry of whether they can be furnished, for copies of the splendid silver-covered twenty-fifth anniversary number of *Telegraph Age*, of January 1, last, impels us to say, and thus save needless correspondence on the subject, that we have a limited supply on hand of papers of that date, possibly two hundred copies. Anticipating the demand, a very large edition was printed which is rapidly becoming exhausted. Of course, when gone it will be out of print. But so long as it lasts we will fill all orders. The price of this particular number is twenty-five cents. The illustrated sketches of the personnel of the telegraph appearing at that time attracted much favorable attention, and have been widely read. Then the illustrated articles giving histories of the Great North Western Telegraph Company, and the Commercial Cable Company, besides a vast amount of interesting telegraphic miscellany, all contributed to arouse an intense interest in the special issue in question. Orders should be addressed to the publisher of this paper.

Obituary.

Nathaniel S. Prime, aged fifty-three years, for twenty-five years assistant cable editor of *The Associated Press*, New York, died on October 17, at his home in Huntington, L. I.

W. J. Crews, whose death was noted briefly in our previous issue, was for twenty years manager of the Postal Telegraph-Cable Company at Raleigh, N. C., but resigned two months ago on account of ill health. He was fifty years old and was born at Lynchburg, Va. He had served the Western Union and Postal companies as operator and manager at various points in North Carolina and Virginia during his entire lifetime.

The New Smith Premier Visible Typewriter.

As telegraphers are close friends of the typewriter, the great body of Telegraph Age readers all over the world will be interested in the following description and illustration of a new invention just offered to the public. This is the new Smith Premier typewriter, known as Model No. 10. Experts speak highly of it, and operators who have tried it pronounce upon its beauty, its symmetry and its light, velvety touch. Telegraphers will welcome it as they have welcomed previous Smith Premier models, for the Smith Premier, with its complete keyboard, has always been a popular telegraphers' "mill."

The noticeable feature of the machine is that it combines the well-known Smith Premier characteristic of the complete keyboard with perfectly visible writing. This model presents many new devices in its construction. It has two series of ball-bearing type bars, which are drop-forged, hung on single row, one-eighth-inch balls, with adjusting facilities. The wearing surfaces and bearing balls are of such size, material and hardness that the manufacturers claim these parts



THE NEW SMITH-PREMIER VISIBLE TYPEWRITER.

to be absolutely indestructible. The instrument presents a column finder and paragrapher, a device entirely new in connection with typewriters, and which permits the selection of any one of several columns by simply pressing a key on the keyboard; useful in addressing envelopes, paragraphing correspondence, tabulating or doing work in columns. The carriage, which is gear-driven, without straps or bands, travels on ball bearings. These carriages are interchangeable and as several lengths are made, it is possible for users requiring machines of various capacities to produce their work on one machine. The platen is detachable as in former models, and when removed takes the writing with it. The tilting platen feature is retained, which makes erasure easy at any point on the line of writing without moving the carriage or turning the platen. There are right and left-hand carriage release levers and a swinging marginal rack which can be brought over the platen for convenience in setting the stops.

All operations of the machine excepting the return of the carriage and line spacing, are ac-

complished from the keyboard, and it is unnecessary for an operator to bend over the machine to perform any of the operations, even that of inserting a new ribbon. The only exposed portion of the ribbon is that in immediate use at the printing point. The ribbon is attached to its spools by means of spring clamps, requiring neither pins nor tapes. The movement of the ribbon is reversed automatically. Bi-chrome ribbons may be used and the color change is controlled by a single key on the keyboard.

The new machine has a back space key on the keyboard by pressure of which the carriage may be set back one space at a time; useful when it is desired to rewrite a character or to insert a character when an erasure has been made. There is a universal line spacer in connection with the variable line spacer, making it possible to write on ruled paper, special forms or at any point on the platen. When this device is used the platen is revolved independently of the ratchet on the head of the platen which fixes the three widths of spacing when the variable line spacer is used. The top plate is so formed that all eraser dust falls to the rear of the machine and away from all mechanism. The top plate is absolutely clear of all mechanism, there being in front of the line of writing at any instant, only that small portion of the ribbon which is in use. The machine is provided with a device so that by a single operation the ribbon mechanism is set for stencil cutting, eliminating the necessity of displacing or removing the ribbon by hand. Machines may be supplied with a decimal tabulator which operates in connection with the column finder. The tabulator keys form the top row of the keyboard. There is provided a carriage controller which retards the movement of the carriage when column finder or tabulator are used and which eliminates shock when the carriage makes long runs down the printing line.

Every part of the machine being made to gage and tested by gage inspection, it is therefore perfectly and actually interchangeable, and the twenty years' manufacturing record of the Smith-Premier Typewriter Company and the hundreds and thousands of its machines that are now in use, is additional guarantee of the excellence of the new product.

This new machine is now on sale at the Smith Premier offices in all important cities, and any reader who is interested in typewriters, or in unusually fine mechanical construction, would do well to inspect this very latest offering.

Mr. C. M. Baker, superintendent of construction of the Postal Telegraph-Cable Company, Chicago, in a recent letter, remarks: "Were it not for Telegraph Age a busy man would not be able to keep in touch with the telegraph world."

Operators will find a fund of practical information in every issue of TELEGRAPH AGE.

LETTERS FROM OUR AGENTS.**SAN FRANCISCO, WESTERN UNION.**

F. H. Morris has been appointed traffic chief and M. B. Brown has been transferred to the overland division as assistant traffic chief. This is a well-earned promotion for Mr. Morris, who has risen from a messenger to the position he now holds, solely upon merit and energy.

Recent resignations include: J. W. Whitely, who has accepted a position at Boise City, Idaho. J. Del Buono has been transferred to Tonopah, Nev., to relieve Operator E. E. Spawr, who has been promoted to the position of manager at that point, vice J. L. Morris, transferred to the Goldfield, Nev., managership.

R. Foster has gone to Arizona, having accepted a position for the winter with the Southern Pacific near Tucson.

P. S. Sullivan has been transferred to Goldfield, Nev., to relieve Operator Stevenson, who returns to Los Angeles, Cal.

C. E. Senseman has returned East, presumably to North Carolina.

Among the recent appointments are: Stanley Allen, J. W. Goenner, A. A. Marlatt, H. J. Thompson and H. Newlander.

Business has shown a decided improvement in the last three months, and it can be safely predicted that in the near future this office will be as busy as in the days before the fire of two years ago. Should the wandering operator return to 'Frisco after a sojourn elsewhere since the fire, a surprise would greet him in the view of the wonderful restoration and reconstruction work that has been so admirably carried out. The newer 'Frisco promises to be more beautiful than before her misfortune.

PHILADELPHIA, WESTERN UNION.

Mr. J. A. Thomas, for many years a very successful and popular manager for this company at Pittston, Pa., has assumed the managership of an important branch office in this city, that at Broad street and Columbia avenue, relieving Harry Hallman, transferred to the main office.

Mr. Thomas is one of the old school operators, well trained and seasoned, and adds greatly to Manager J. W. Reed's staff of city branch office managers.

Mr. George McCoy, from Carlisle, Pa., succeeds Mr. Carney as manager of the Kensington avenue and Lehigh avenue branch office. Mr. Carney goes to the main office.

The Barclay system which, by the way, has reached a state of perfection here, is one of the show places in the office. Visitors are amazed at its almost human action and the scope of its wonderful work. Several hundred students accompanied by their professors, from the Pennsylvania State College, were recent visitors.

PHILADELPHIA, POSTAL.

A change has been made in this office, which seems to have pleased all concerned, and that

is the moving of the Rowland machines from the dark corner of the room over to the window side. This will eliminate the use of artificial light, which it was necessary to employ all day long.

Another improvement in this office was the altering of the position of the electric lights. Heretofore there were clusters of lights hung all along the center of the room. These were changed to lights hung a little lower and with extension arms reaching over the center of the desks. This rearrangement will distribute the light much better.

Mr. B. H. Moore, of the manager's office has resigned to enter other business.

Mr. Albert Zintl, formerly manager of the cotton district office, Front and Chestnut streets, has been appointed assistant manager at the main office.

Mr. Philip Riley, former manager of the office in the Arcade Building, Fifteenth and Market streets, has been appointed to succeed Mr. Zintl in the cotton district, and Mr. H. B. Given, formerly an operator in the main office, takes Mr. Riley's place in the Arcade Building.

NEW YORK, WESTERN UNION.

Robert C. Rattray, formerly of the operating department, died lately at Concord, Mass. While he had been ailing, his death was unexpected, and the news of his passing away will shock a host of friends. Mr. Rattray was a telegrapher of rare ability and well known throughout the United States and Canada.

Sympathy is expressed for Mr. T. P. Hale, chief of the underground system, because of the death of his daughter, Mrs. Blanche Boschen, which occurred at her home, Irvington, N. J., on Friday, October 16.

OTHER NEW YORK NEWS.

The annual entertainment and reception of the New York Telegraphers' Aid Society, in behalf of the relief fund, will take place in the Lexington Avenue Opera House and Terrace Garden, on Tuesday evening, November 10. Mr. R. J. Marlin, chairman of the entertainment committee, states that the programme will be of a very high class and under the immediate direction of Mr. George Leveene, a gentleman who has displayed much ability in staging the productions of the society for many years. The well-known musician, Professor M. J. Ryan, leader of Squadron "A" band, has again been secured for the musical portion of the entertainment. Judging from the advance sale of tickets and the unusual demand for private boxes, it has been anticipated that there will be a large attendance, presaging success, and the realization of a substantial addition to the relief fund. The entertainment committee is made up as follows: R. C. McDonald, George Leveene, W. H. Mathews, H. C. Worthen, R. J. Murphy, W. J. Quinn, J. J. Scanlin, J. H. Driscoll,

C. D. Correll, John Roe, J. A. Henneberry, A. M. Lewis, H. Zweifel, Jr., E. C. Cremins, W. W. Price, F. J. Sheridan, J. F. King, J. F. Zeiss, W. E. Cardwell, T. E. Fleming, J. M. Shay, F. L. Catlin, J. J. Riley, J. A. McNulty, N. J. Crean, R. H. Corson, F. A. Pirie, J. F. E. Hopkins and J. P. Clolery.

Mr. Max Handler, agent of the Gold and Stock Telegraph Company, at Cleveland, O., is on a vacation, the first that he has taken in years, and is making quite an extended journey, including in its itinerary visits to New Orleans and New York, meeting and being entertained by many old friends in both cities.

Stick to Facts.

The demagogue in politics comes unmistakably to the front in a time of a great national election contest like that of the present. A Michigan Congressman is seeking re-election, a right undeniably his, and as he hails from a district in which his party is in the majority, he doubtless will be returned to the National Legislature. What we take exception to is the fact that this aspirant for Congressional honor in his canvass seeks to make it appear that the telegraph as such should be considered a factor in the campaign. He assumes to pose as an authority and critic respecting the telegraph, giving utterance to statements wholly at variance with facts, a proper understanding of which he either will not or cannot comprehend. If he could only be brought to realize how utterly silly and misleading some of his grandiose remarks are, the sixth Congressional district of Michigan might be the gainer, and certainly the halls of Congress, where at least intelligent criticism should be heard, would derive benefit from saner thought.

A member of the telegraph profession in Chicago, Ill., has been charged with fraud in having filed six petitions in bankruptcy within nine years. He is accused of being a professional bankrupt and of making a specialty of preying on money lenders. It is asserted that he charged his friends a fee to show them how they could borrow to the limit of their credit and then have the debts wiped out by instituting bankruptcy proceedings. He is also charged with going to certain money lenders and threatening to induce all their customers to start bankruptcy proceedings unless he received a regular salary from the money lenders.

The Standard Oil Company is laying another pipe line from Indiana and Ohio to Jersey City, N. J. The telegraph wires will follow the pipe line for the purpose of connecting telegraphically the pumping stations which are usually located about thirty or forty miles apart. The length of the line will be about seven hundred miles.

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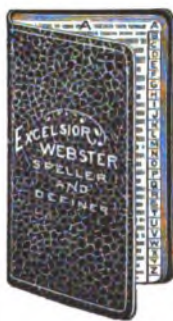
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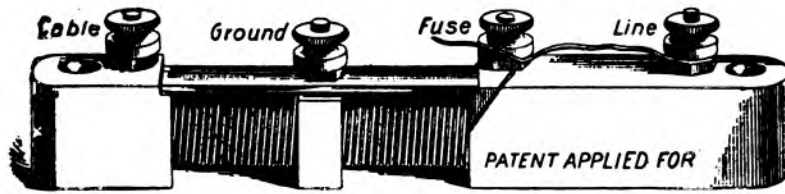
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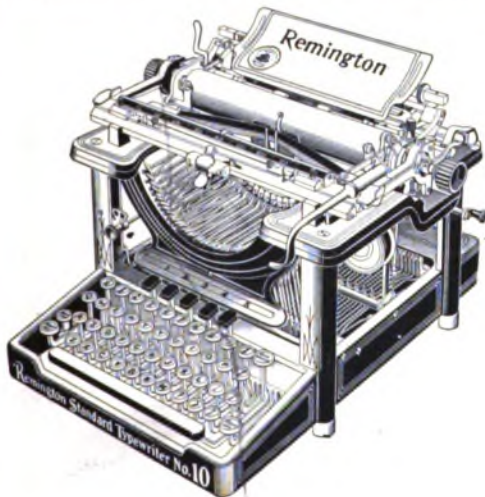
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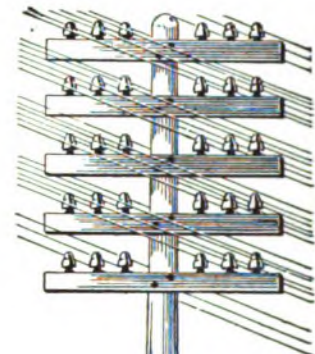
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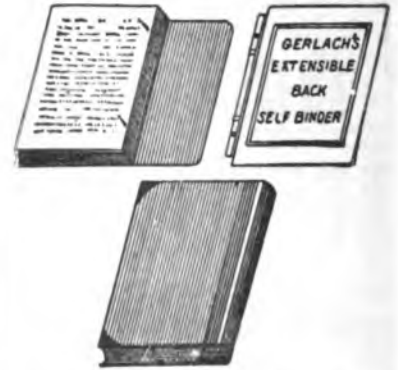
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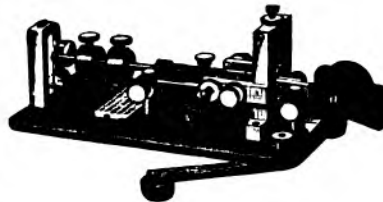
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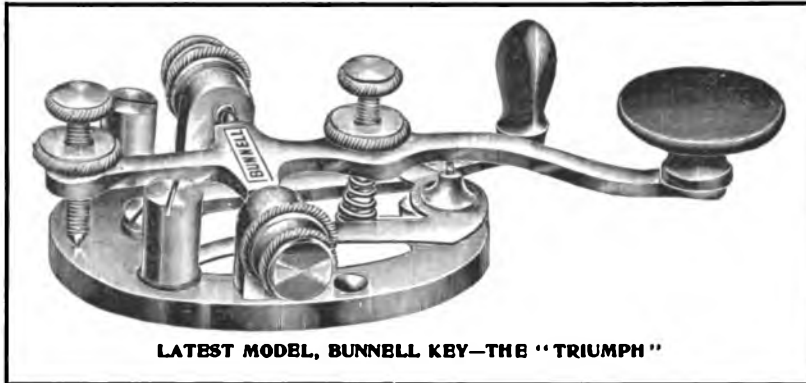
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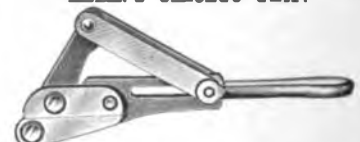
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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

Elementary Lessons on the Operation of Repeaters. (PART II.)

In the preceding installment of this article the first practical method invented for automatically repeating the signals made in one wire into that of another was shown in the illustration of the Wood button repeater. This arrangement, however, possessed the disadvantage of not only being unable to permit operators in the second wire to break without a change in the connections at the repeater station being first made, but it required the constant presence of an operator at the repeater to listen and make the change, viz.: turn a switch lever.

The next step in the development of the repeater was to devise a means of automatically performing the work of the attendant. Different inventors employed different methods, but their respective efforts were all directed toward harnessing the repeating points or lever of one repeating relay in such a manner that they could not interfere while the companion relay contact points were in control of the circuit. Hence in studying the operation of different types of repeaters the distin-

guishing feature of each will be found by observing closely the manner in which this one common aim is accomplished.

Among the first practical automatic repeaters that required no attendant to reverse the direction of repetition was that known as the Milliken repeater, the invention of George F. Milliken, of Boston. In this arrangement an extra magnet in a local circuit and a strong retractile spring do the work without human aid.

Figure 1 shows the manner in which the extra magnet operates. It is placed above the relay coils in the position shown in order that its inverted lever may rest against the lever of the main line relay. The retractile spring of the extra magnet is purposely given a tension that is stronger than that of the relay spring in order that the relay lever may not fall back or "open" when the line wire opens at such times as it is

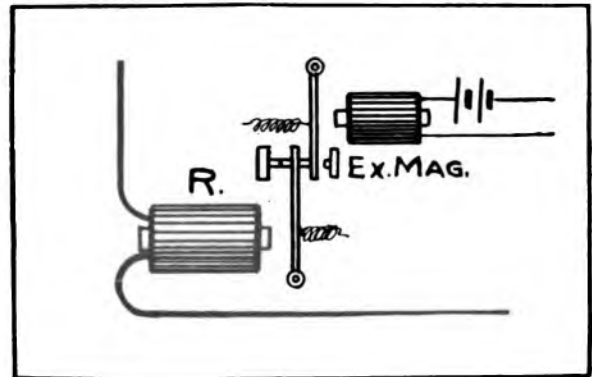


FIG. 1.

necessary to keep the said points closed, while the strength of the extra magnet itself is made so great that it is able to overcome its own retractile spring and thus remove the extra magnet lever when the relay lever should be free to fall back during its legitimate operation.

This extra magnet is controlled by the repeating apparatus in the other half of the set, not shown, however, in the diagram. The effect is the same as that accomplished by the button repeater inasmuch as it prevents one relay from acting as a repeater while the other is in operation. As the same arrangement exists in each half of the repeater set it is not necessary to first reverse any connections before a receiver can break. It repeats in either direction without further attention.

In the Toye repeater, quite extensively used at one time, the contact points of the relay which should remain inactive while the other is in operation, is kept closed by preventing the relay core

from becoming demagnetized. This is accomplished by providing another circuit for the battery at the instant the line opens. This causes the current to still flow through the relay in the other wire and obviously holds the lever in its closed position.

Figure 2, which shows the full connections in order that the student may see how transmitters

opens, but in this event it is relay R' that remains closed. One disadvantage the Toye repeater possesses is that the battery is constantly supplying current whether the main line wire itself is open or closed. In other types the current is saved during each second of time the circuit is open. But with the Toye the rheostat absorbs it during the idle moments of the lines. Before

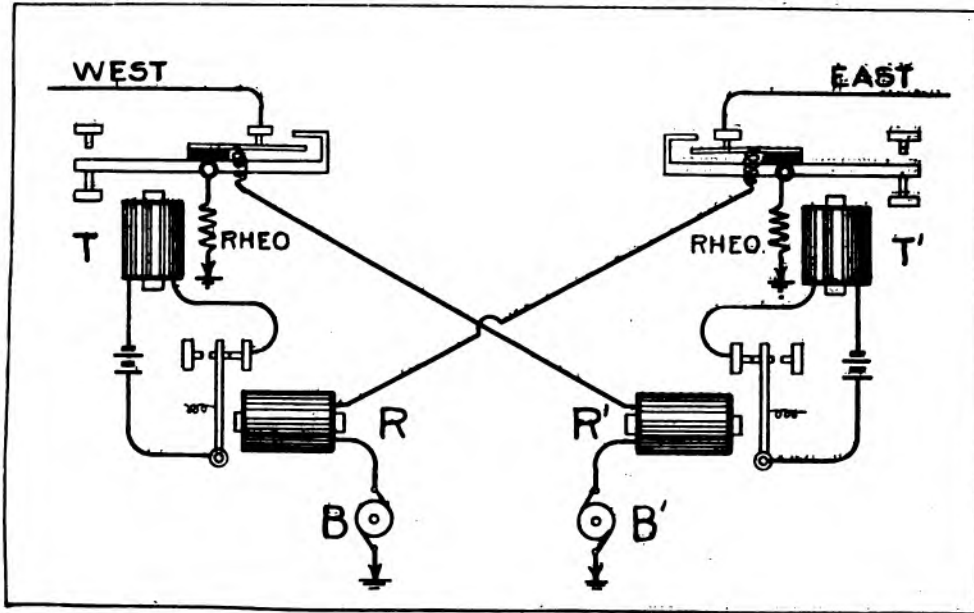


FIG. 2.

controlled by the relays really do the work in actual practice, indicates how this is done. We will suppose the western circuit opened. In this case relay R' would open and thus cause transmitter T' to open. As the battery B which supplies current to the eastern circuit also traverses the coils of relay R, the resulting opening of this eastern wire at the contact points of transmitter T' would demagnetize relay R, and at the contact

the dynamo supplied currents for telegraph circuits this double drain on chemical batteries was a serious matter. Aside from this fault the Toye is one of the easiest handled and most efficient repeaters ever invented. The amount of resistance inserted in the rheostat is generally made about the same as that of the line, but it is not necessary to be particularly accurate about that matter. The point is to give the artificial line a resistance value that will cause enough current to remain in the relay coils when it shifts in that direction, to hold the armature closed.

THE HORTON REPEATER.

Figure 3 shows the distinguishing feature of the Horton repeater. In this device the contact points of one relay remain closed, when its core becomes demagnetized, through the influence of gravity, as the lever possesses no retractile spring to lift it from its normal position on the front-stop, on which it rests by virtue of its own weight.

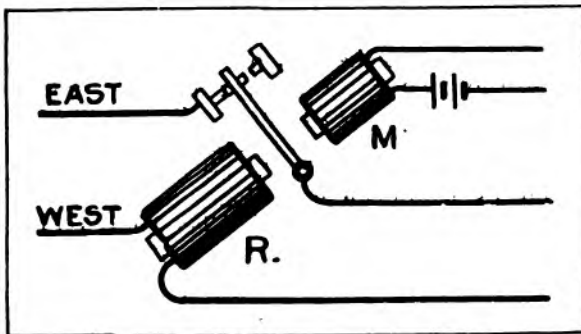


FIG. 3.

points of the other transmitter open battery B' also. In order to prevent this opening an artificial line in the form of a rheostat is connected to the lever bar of the transmitter so that when transmitter T' does open, the current flowing through relay R simply shifts its course from the eastern wire to the rheostat, and relay R remains quiet. Similar action occurs when the eastern wire

As may be seen in the diagram the magnet coils are not set level on the base as in other types. One end is purposely raised higher than the other in order to give the said lever the necessary angle or inclination to take advantage of the force of gravity. As there is no retractile spring on the relay and it is necessary that the lever should open and close in the usual way when required to repeat signals into the other circuit, the extra magnet M in a local circuit con-

trolled by the companion relay and repeating points, perform the duties of the said spring. At such times as the lever should fall back, but cannot without aid, the local circuit containing magnet M closes and the latter attracts the lever in the same direction that a spring would have forced it; that is to say, in an open position. When the line closes again the consequent opening of the local circuit demagnetizes the extra magnet M and allows the lever to fall "closed" again through both gravity and the magnetic attraction of the relay itself.

(To be continued.)

The Barclay Printing Telegraph System.

BY WILLIAM FINN.
(Part XI.)

THE RECEIVING APPARATUS.

(In the November 1 installment of this series, Fig. 30 was inadvertently referred to as a "multiple" instead of as a "series" arrangement of relay winding. The "multiple" method is illustrated in Fig. 33 of the present issue.)

For the reception of the signaling impulses transmitted over the main line, a polarized relay of the particular type illustrated in Figs. 31 and 32* is employed at the receiving station. This relay possesses the merit of having a very low

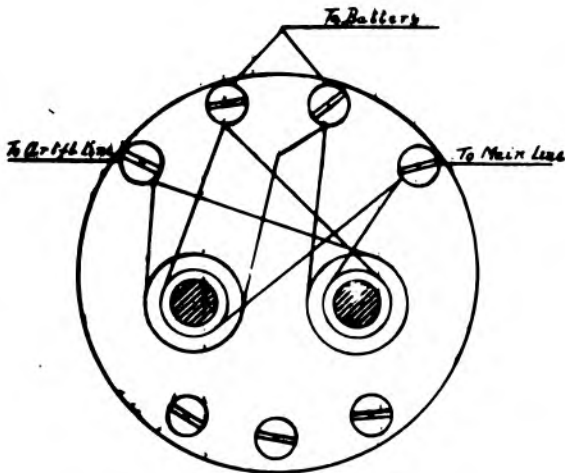


FIG. 33.—DIFFERENTIAL COILS IN "MULTIPLE."

"time constant," the design and construction of the instrument being such as to render it highly susceptible to the very first impulses of the received current. Not only are its moving parts made quite light and nicely balanced, in order to minimize the effects of mechanical inertia, but the magnetic inertia of the electro-magnet itself has been greatly diminished by introducing additional air gaps in the path of the magnetic lines of force. This is effected by suppressing the iron bar, or yoke, ordinarily connecting the two limbs of the magnet core, an arrangement that permits the lat-

ter to receive and part with its magnetism much more promptly than would otherwise be the case. For, it should be understood, that in rapid telegraphy we are not so much concerned about the total amount of magnetism that any given current will develop in the receiving apparatus as that it should quickly rise to that smaller portion of its final value at which the apparatus begins to respond.

The parallel or "multiple" method of winding the relay, as shown in Fig. 33, still further re-

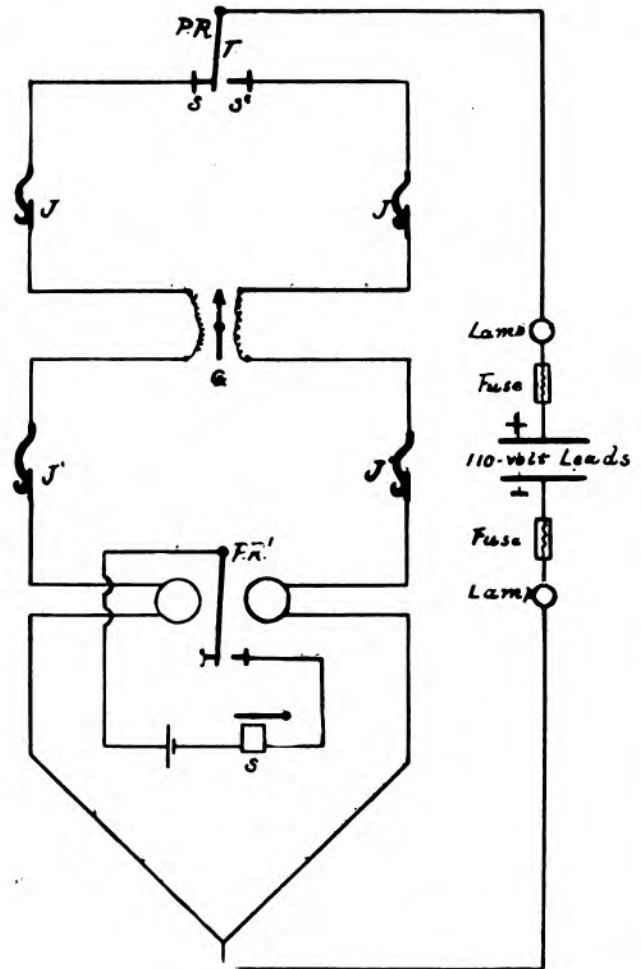


FIG. 34.—THEORETICAL ARRANGEMENT OF LOCAL CIRCUIT REPRESENTED IN DETAIL IN FIG. 35.

duces the "time constant" of the instrument by allowing the current traversing its coils to attain a certain strength (about two-thirds of its full value) in a shorter period of time than if the windings were connected in "series" as represented in Fig. 30, shown in the issue of November 1 (see explanatory correction at head of this article).

With the exception of a galvanometer, this relay is the only instrument in the main line at the receiving end of the circuit, and the signals reaching that point, before becoming translated into readable characters, are first repeated by the relay into a set of local apparatus comprising a galvanometer G (Fig. 35) for detecting local "bias," and a polar relay PR' for operating the local

* See November 1 issue of Telegraph Age.

sounders S and S'. In addition thereto a "printer" relay (which directly or indirectly controls all of the printing appliances) is "jacked in" at J as soon as the circuit is ready for business, while a

illustrated in Fig. 34. from which it will be seen that as the tongue T of main line relay PR vibrates between the contact stops S.S' in obedience to the line impulses, a positive current from the

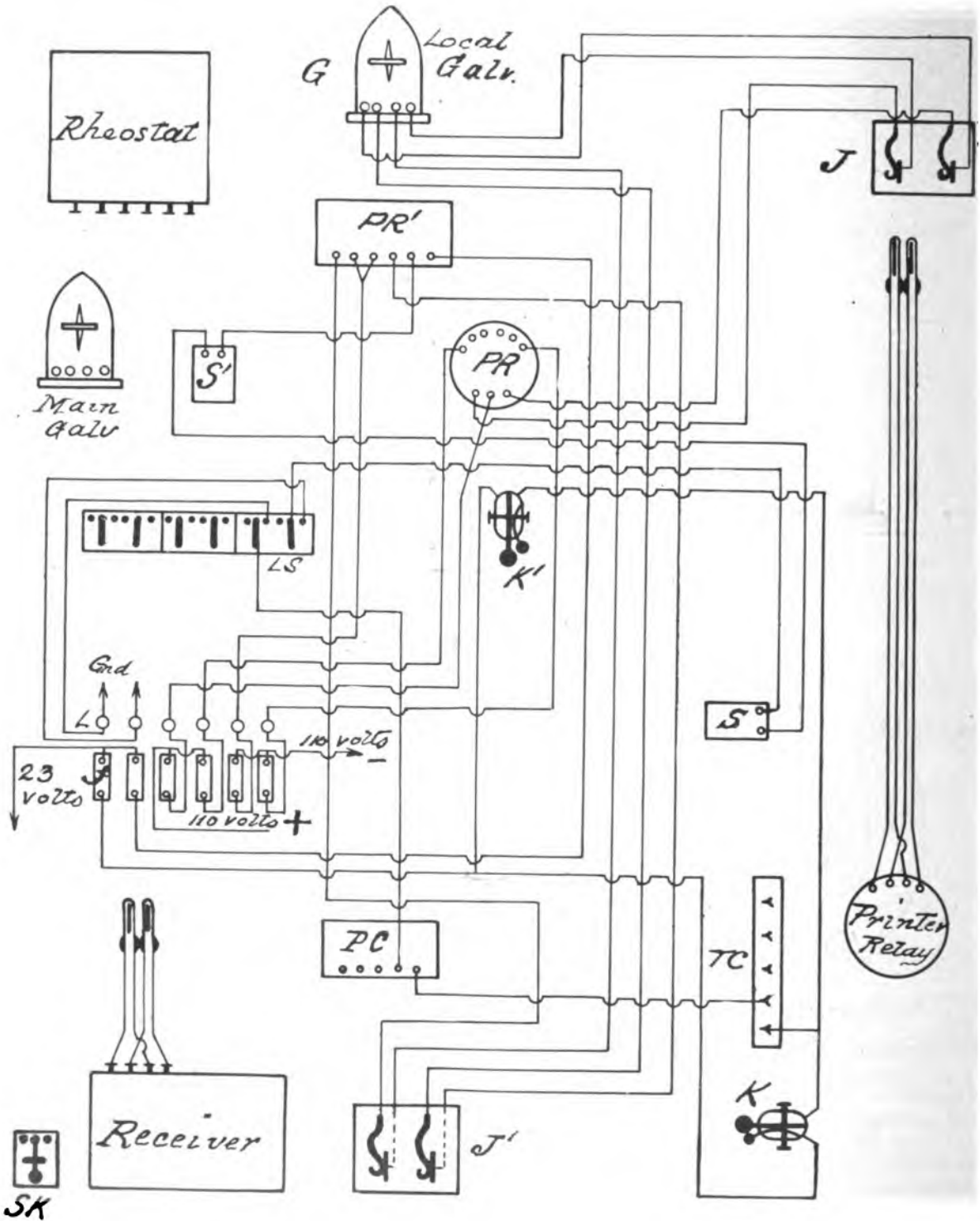


FIG. 35.—BARCLAY PRINTER: LOCAL CONNECTIONS, BALANCING SET.

Wheatstone receiver is similarly inserted at J' whenever occasion requires its presence in the circuit.

The theoretical arrangement of this circuit is

110-volt electric light lead is alternately caused to flow through first one and then the other of the instrument coils connected with said stops; the result so far as the apparatus is concerned be-

ing similar to that of transmitting currents of reverse polarities through them.

The actual connections of the apparatus may be traced by reference to Fig. 35, which shows the standard method of wiring and connecting up both the sending and receiving local apparatus. In this figure the main line relay is seen at PR, while PR' represents another polar relay for actuating the two local sounders S and S', one of

whether any "bias" develops in the local circuit so that it may be removed by suitable adjustments of the main line relay PR.

The local circuit on the sending side may be traced as follows: From the 23-volt lead shown on extreme left-hand side of diagram, through nearest fuse block f to key K, thence to transmitter clip TC, polechanger PC, local switch LS, and lamp L to ground. A second key K', for op-

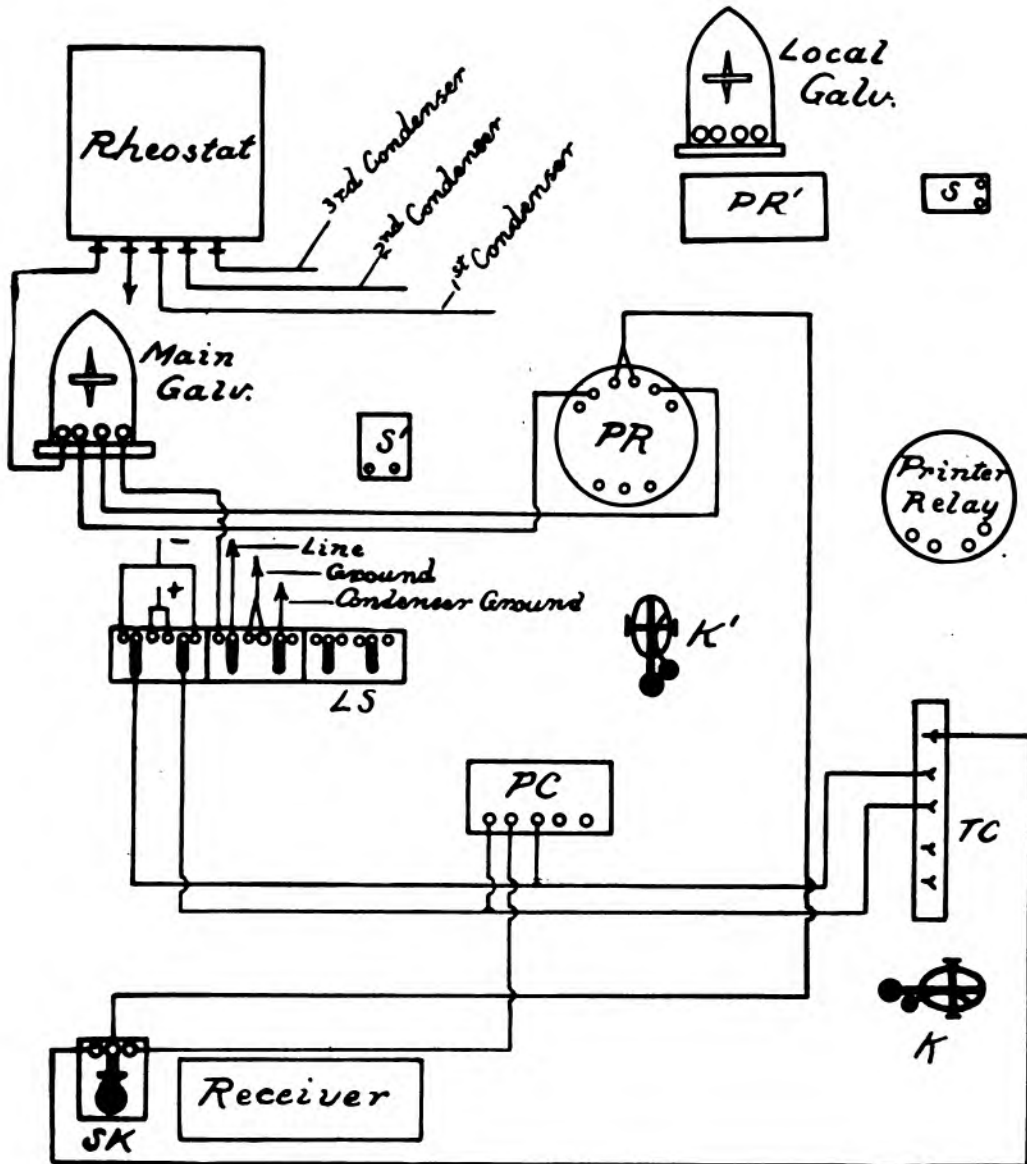


FIG. 36.—BARCLAY PRINTER: MAIN CONNECTIONS, BALANCING SET.

which is placed on the printer table and the other near the "balancing" set. The "printer" relay and Wheatstone receiver with wedge attachments for insertion into their respective spring-jacks J and J', are plainly shown, as is also the local galvanometer G, the particular function of which is to indicate by the deflection of its needle (when the distant transmitter is running free of slip)

erating the polechanger PC, is situated near the "balancing" set as a matter of convenience.

The regular wiring arrangements and method of joining up the main and artificial line apparatus are distinctly shown in the working diagram, Fig. 36, which requires no explanation further than to say that the purpose of the strap key SK is to afford a convenient and reliable means of trans-

ferring the main line from the transmitter to the polechanger, the latter of which can then be operated from the balancing table and thus facilitate the work of balancing, etc.

(To be Continued.)

Recent Telegraph Patents.

Mr. S. H. Tyson of Zanesville, O., has been granted a patent for a telegraph pole. The pole has a concrete base seven feet high, which will rest in the ground. Five steel rods extend upward from this base. A crossbar for the wires is at the top. Mr. Tyson says the invention can be made to sell at as low a price as cedar poles now bring, and that when painted from time to time it will last without limit.

A patent, No. 901,372, for telegraphy, has been granted to Louis M. Potts, of Baltimore, Md. The method of balancing a plurality of electric circuits, which consists in separately indicating the relative effects of the different constants of the circuits and changing the values of said constants until a balance of each is indicated.

A patent, No. 901,861, for a telegraphic sounder, has been issued to Vincent C. De Ybarrondo, of Los Angeles, Cal. A sounder for telegraphic systems having means adapted to be substituted for the gong of an electric bell, whereby the hammer can be used for giving the sounds.

A patent, No. 901,957, for a telegraphic code condenser, has been awarded to Matthew B. Dickie, of Glasgow, Scotland. Three circular scales are arranged parallel and have different numbers and letters.

The following patents have expired:

Patent No. 461,470, for a telautograph, held by E. Gray, of Highland Park, Ill.

Patent No. 461,471, for an art of telegraphy, held by E. Gray, of Highland Park, Ill.

Patent No. 461,472, for an art of and apparatus for telautographic communication, held by E. Gray, of Highland Park, Ill.

Patents Nos. 461,473 and 461,474, for a telautograph, held by E. Gray, of Highland Park, Ill.

Personal.

Mr. Darwin Z. Curtis, a well-known telegrapher, at present Detroit representative of the Hearst News Service, was elected at the late election to the Michigan State Legislature.

Mr. N. De Bree, for many years manager of the Postal Telegraph-Cable Company at Toledo, O., and a member of the United States Military Telegraph Corps, is now located at Santa Cruz, Cal.

Mr. G. W. Blanchard, formerly and for many years superintendent of the Postal Telegraph-Cable Company, New York, and for the past two years engaged in the real estate business in this

city, has returned from Mt. Clemens, Mich., where he has been sojourning lately for the benefit of his health, much improved physically.

Mr. David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, and the author of "Lincoln in the Telegraph Office," will deliver a lecture bearing the title of his book, at the Fourth Presbyterian Church, New York, on the evening of November 16.

Mr. Bertram M. Downs, who for so long a time has served as its general manager, has been elected vice-president of the Brookfield Glass Company, manufacturers of telegraph insulators, whose offices are in the United States Express Building, New York. Mr. Downs is well known in telegraph circles and is a vice-president of the Magnetic Club, of New York.

Mr. William H. Baker, formerly vice-president and general manager of the Postal Telegraph-Cable Company, New York, has become identified with the telephone, joining forces with the American Telephone and Telegraph Company, with offices at 15 Dey street, New York. Mr. Baker's services in this new field of endeavor should be of peculiar value, inasmuch as it introduces an accomplished telegraph executive, of wide experience, into a business in many ways so closely analogous to that in which he has been engaged. Mr. Baker at fifty-three years of age, with splendid health, is in the prime of life and should constitute a forceful personality in the interests with which he is now associated.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Belvidere Brooks, general superintendent; A. G. Saylor, assistant general superintendent; D. Roth, superintendent of construction, and W. N. Fashbaugh, electrician of the Eastern division, are making a tour of inspection of the offices between New York, Washington, Pittsburgh and Buffalo.

At no previous time in its history has the praise of the company been more eloquently heard than that uttered in behalf of the superb service it rendered election night. Not only were the bulletins handled heavy in themselves, but the expedition of movement surprised even old-timers. Everybody was in excellent spirits and the Western Union easily met the responsibilities put upon it.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

President Clarence H. Mackay entertained about fifty of his personal friends in his private office, which was handsomely decorated, on election night. A large map of the United States was mounted in the office, each State having inserted in it a bullseye lens. These lenses were brilliantly illuminated by lamps placed at the rear of the map. At each side of the map were lists showing the electoral votes of the various States,

and the States in which Governors were to be elected. Opposite the name of each State bullseyes similar to those upon the map were placed. As the returns came in colored lenses were substituted for the clear lenses in the bullseyes, the different colors indicating the result in the State so marked, thus all the Republican States showed red and the Democratic green, etc. Mr. Mackay's guests were thus enabled to see at a glance how the election was going both generally and in detail, and the interest they displayed in this method of keeping track of the election showed that it was very effective and satisfactory. A regulation quartette table equipped with a complete outfit of resonators, typewriters, etc., was used in this connection and special blanks were printed.

Mr. Mackay presented each of his guests with a souvenir miniature sounder suitably engraved commemorative of the unique occasion.

The officials of the company, all of whom were on hand on the night of the election, were also well satisfied with the service rendered, and speak in terms of high praise of the energy, loyalty and enterprise displayed by the Postal forces everywhere.

At a meeting of the trustees of The Mackay Companies held November 5, H. V. Meredith, of the Bank of Montreal, Montreal, Que., was elected a trustee. In view of the large holdings of Mackay Companies' shares, preferred and common, held throughout Canada, it was felt that Montreal should be represented on the Board of Trustees. The Mackay Companies have now two representatives in Canada, Mr. Meredith and Mr. R. A. Smith, of the firm of Osler and Hammond, Toronto.

Dr. Osuke Asano, chief electrician to the Imperial Department of Communications, Tokyo, Japan, was a recent visitor at the office of Minor M. Davis, electrical engineer. Dr. Asano is in this country for the purpose of examining the telegraph systems for the benefit of his Government.

This company has moved into a new and up-to-date office at Mobile, Ala.

The dynamo equipment of the Montgomery, Ala., office has been rearranged to facilitate the service at that point.

The operating room and business office at Augusta, Ga., were moved November 10 to the new quarters already mentioned in these columns. The Augusta office is now one of the best-equipped in the Southern division.

The Coming Dinner of the Magnetic Club.

The annual dinner of the Magnetic Club, of which extended notice was made in the October 16 issue, will take place at the Hotel St. Denis, Broadway and Eleventh street, New York, on Wednesday evening, November 18, the hour appointed being half-past six o'clock. This dinner, it will be remembered, will celebrate the twen-

tieth anniversary of this well-known club, and in consequence it promises to be a highly enjoyable affair, for which considerable preparation has been made. It is expected that a large company will sit down to the tables, among whom there will be a number of visiting delegates in town to attend the annual meeting of the Telegraphers' Mutual Benefit Association, besides other guests. There will be some good speaking and some good music, both of which it may be said wait upon good digestion.

The Cable.

Cable communication was interrupted November 12 with:

Venezuela	Jan. 12, 1906
Madura Island (Dutch East Indies)	Feb. 3, 1908
Macao	Aug. 29, 1908

Messages can be mailed from Hongkong.

The recent appointment of H. S. Baxendale as manager and secretary of the Pacific Cable Board at London, vice C. H. Reynolds, general manager, deceased, advances to high executive office a man who has risen in the telegraph service from the ranks. Mr. Baxendale entered the cable service as an operator in the employ of the Eastern Extension Telegraph Company and was sent out to Singapore about twenty years ago, subsequently joining the British Administration of Posts and Telegraphs in the Malay States.

The Telegraph in Holland.

From statistics just at hand, it appears that the telegraph system of Holland during the year 1906 attained a total of 7,054 kilometers of line, and 33,340 kilometers of wire; 3,526 and 1,160 meters of underground line were laid in iron and asphalt conduits respectively, while underground cables attained a length of 278,828 meters; and sub-river and marine cables, 250,035 meters. The increase in the latter figures is 30,723 and 11,477 respectively. Interruptions of the service numbered 4,864, as against 5,010 in 1905. The offices totalled 1,241, being an increase over 1905 of 29. Of these the state owned 273 telegraph and 614 telephone offices, and 7 semaphoric stations, and 347 were owned by private interests. There were in use six hundred and seventy-seven Morse, one hundred and forty-three Hughes, four Baudot and four hundred and forty-six speaking instruments. The inland traffic decreased by one and two-tenths per cent, in comparison with the previous year, and totalled 3,072,166 telegrams. The average number of words per telegram was 14.70. The international traffic amounted to 3,190,042 telegrams. The figures for the wireless telegraph service are interesting; 475 radio-telegrams were despatched to inland places, and 1,859 to international places, while the numbers of messages received were fifty-four and twenty-four, respectively.

The Western Electric Company.

The directory of the Western Electric Company has undergone some very important changes in its executive staff. Enos M. Barton, president, an old-time telegrapher, after nearly forty years in the service of the company, has retired and has become chairman of the board of directors. Mr. H. B. Thayer, the head of the New York interests of the concern, succeeds to the presidency, and will continue to make his home in the metropolis. It was officially announced at the meeting of the directors that the company was engaged in consolidating its manufacturing business at its Hawthorne plant in Chicago. It is removing to that plant the manufacturing carried on heretofore at Clinton street in Chicago, and part of the manufacturing which has been conducted at the company's factory in New York City. Some of the engineering and other administrative work of the company will be conducted at New York. This is announced to be for the purpose of avoiding duplication between the Chicago and New York offices and between the engineering department of the company and the telephone companies, its principal customers. The publicity department, under H. M. Post, has already been moved from Chicago to New York. Aside from the elevation of Mr. Thayer to the presidency, other changes were made. H. A. Halligan and F. R. Welles were elected vice-presidents; William P. Sidley, vice-president and general counsel, and George C. Pratt, secretary. Mr. Thayer has been connected with the company for twenty-eight years. Mr. Halligan has been for a number of years secretary and in charge of a large part of the American business. Mr. Welles' connection with the company dates back for more than thirty years. He has had charge of the foreign business, residing in Paris. Mr. Sidley has been acting as counsel for the company and will continue in that capacity.

A Society Pin for the United States Military Telegraphers.

The question of adopting a society pin or button for the Society of the United States Military Telegraph Corps, having arisen, it is recalled that a pin of this nature was once actually in existence. In fact, at the meeting held at Kansas City, Mo., September 15, 1890, the secretary at that time announced the selection of a pin or button of gold and enamel, which the members then present purchased at a cost of \$1.50. Subsequently the pin seemed to pass into disuse and its very existence has been forgotten by many, and the design entirely so. In furtherance of the present suggestion to adopt a pin which shall become a permanent symbol of the society, inquiry has been made for one of the former pins to serve as a possible guide in influencing a new design. It is a singular fact that no one thus far approached in the matter has been able to respond with the production of the long-forgotten emblem. It is requested that any member

having in his possession one of the old pins will communicate with David Homer Bates, secretary of the Society of the United States Military Telegraph Corps, 658 Broadway, New York.

Telegraphers' Dinner to Mr. Carnegie.

A dinner is to be given to Andrew Carnegie by his telegraph friends at the Hotel Manhattan, New York, on the evening of Friday, November 27, tendered in celebration of the seventy-third anniversary of his birth, an event, however, which correctly dates on the 25th inst. The following correspondence, which owes its origin to the suggestion of William J. Dealy, of New York, explains itself:

New York, July 14, 1908.

Mr. Andrew Carnegie,
Skibo Castle, Scotland.

Dear Sir:—You will be 73 years old November 25, 1908. "73" is the "God be with you" of our telegraphic code, the fraternal signal recognized all over the world. It would seem therefore quite appropriate for you to meet the telegraph friends of your youth and of your later years at a dinner on or about the date named.

A few of us have talked the matter over and authorized me to ask if you will accept our invitation to be present at such a gathering.

Yours very respectfully,
DAVID HOMER BATES.

Skibo Castle, Scotland,
July 24, 1908.

Mr. David Homer Bates,
658 Broadway, New York.

Dear Homer: That "73" business is taking, but don't go to too much trouble about it. If it comes with little effort all right. "73"

All well. We are up on High Moors, fifteen miles from Skibo; two weeks in retreat. Enjoying it hugely.
Yours ever,

A. C.

P. S.—It should be after not before the 25th.

The committee of arrangements includes, David Homer Bates, chairman; Belvidere Brooks, Charles P. Bruch, Albert B. Chandler, William J. Dealy, James Merrihew, Charles A. Tinker, Levi C. Weir and William B. Wilson. Colonel Robert C. Clowry will preside.

This affair, so full of promise to its promoters and all who expect to be present, will recall in its cordiality of expression the delightful and highly successful dinner tendered at the same hotel on March 28, 1907, by the United States Military Telegraph Corps to its commanders General Thomas T. Eckert and Colonel Robert C. Clowry, its historian, Colonel W. R. Plum, and to the father of the corps, Mr. Carnegie, an event which Mr. Carnegie has held in high appreciation.

The fact that the dinner will be held at the Hotel Manhattan brings pleasantly to mind another interesting fact, namely, that Mr. William S. Hawk, the proprietor, is a personal friend of Mr. Carnegie, who when the former was proprietor of the old Windsor Hotel, made that hostelry his New York home. It may be presumed therefore, that on the 27th inst., as at the function of last year, nothing will be omitted to make the occasion one of enviable satisfaction.

System of Simultaneous Telegraphy and Telephony Over Telegraph Wires.

Experiments made by Aurio Carletti under the auspices of the Italian telegraph department between Caserta and Piedimonti are here described. The work was undertaken for the purpose of testing the Perego separator of simultaneous telegraphic and telephonic messages, but the device was found unsuitable for use between any two subscribers and could only be employed between the two offices at the extreme ends of the line. Better results were obtained with the arrangement shown herewith. The telegraph currents are separated from the telephone currents by means of a condenser *C*; *T* is a telephone transformer of the kind usually employed for connecting a single-wire to a double-wire line; *j* is the jack at the switchboard. In order to make the variable period of the telegraph currents slower and deaden the noise produced by them in the

turbed the telegraph service too much. Furthermore, the impedance depends chiefly on the frequency, and consequently the leakage of the telephone currents will not be equal for all harmonics: It will be greater for the lower sounds and smaller for the higher ones, and thus the voice will be distorted. Another cause of serious disturbance is the intermittent exclusion of the telegraph receiving circuit. In the receiving position the electromagnet of the telegraph instrument will be in series with the coil *g* and add its impedance thereto; in the transmitting position the line is connected to the battery and the telephone currents can leak away freely through the battery, and thus the telephone current will be alternately weak and strong. To remove this difficulty an impedance coil might be inserted between the telegraph key and the battery, but this arrangement would be too complicated and would greatly increase the resistance and inductance of the telegraph circuit. A simpler artifice, which gives the same results,

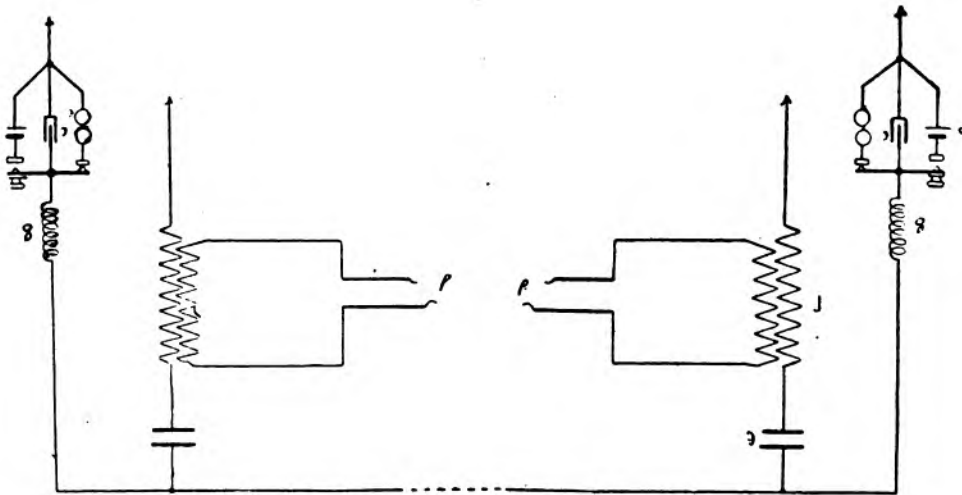


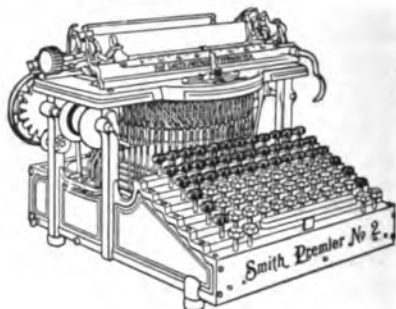
DIAGRAM OF CIRCUIT FOR SIMULTANEOUS TELEPHONY AND TELEGRAPHY.

telephone receiver the well known arrangement of Van Rysseleghe was employed, which consists chiefly of a coil *g* with strong self-induction connected in series with the line, and of a condenser *C* of two microfarads in multiple with the line. The coil *g* also serves for resisting the leakage of the telephone currents through the telegraph apparatus, the coil acting in this case as an impedance against the high-frequency telephone currents, so that they will pass preferably through the condenser *C* and the secondary of the transformer *T*. To the telegraphic currents, on the other hand, which are continuous, the coil *g* offers only its ohmic resistance. This arrangement gave good results and permitted communication from Piedimonti with subscribers in Caserta, Naples and Rome. However, there still was a considerable leakage of current through the telegraph instrument, which was detrimental. One way of reducing this leakage was to increase the impedance of *g*, but that would have dis-

is to put the telegraph receiver in series with the line. In this case the Morse receiver acts also as an impedance, and therefore the coil *g* may be eliminated. An arrangement which has not yet been sufficiently tested, but which might completely remove all the difficulties referred to is to put the transformer *T* in series with the telegraph line. In this manner all the telephone current is utilized, because it passes entirely through the transformer and the remainder escapes at *A* through the telegraph receiving group. The arrangements described are not suitable when the telegraph wires are disturbed by industrial currents.—Abstracted and translated from *L'Elletricista* (Rome), by the New York Electrical Review.

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NOVEMBER 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.

The telegraph service in the late election has been very generally commented upon for its excellence. A fine record was made. While the almost perfect weather conditions which prevailed throughout the country contributed as a factor in aiding telegraph transmission, at the same time it acted to draw out a very large vote, protracting and making the work of the count more difficult and the sending heavier. The newspaper press has not been slow to recognize and give full credit for the promptness and high efficiency shown. So well pleased, indeed, were the big metropolitan dailies that many of them sent individual letters of thanks to the telegraph companies for services rendered. The result of the election in the Empire State was known here in New York before seven o'clock in the evening. By half-past nine o'clock telegraphic reports from

all states were received giving substantially correct figures of returns proclaiming the election of William H. Taft. The telegraph never played a more important part in the history of this country and never did its work so well as on November 3.

Neatness, Order and Discipline in Telegraph Offices.

Anyone of observant mind who has traveled in England cannot but have noticed the neatness and order which as a rule pervades the telegraph offices of that country. The spirit of respectful discipline existent in the service is another thing strikingly exhibited, finding agreeable expression even in the attitude of the messenger boy, whose usually cleanly and tidy appearance places him frequently in sharp contrast with his prototype on this side of the Atlantic. Americans are quick to see and prone to comment on such differences as those referred to, the criticisms evoked not always being to our advantage. It is unfortunate that sufficient cause should exist warranting such censure, more especially because there is no need of it, and because the evidence of careless conditions in office administration have a tendency to work to the detriment of the telegraph itself in public esteem.

Yet it must be apparent that the domestic situation as cited is well known to every superintendent and other officials whose duty of inspection brings them in direct contact with individual offices. While the existence of laxity in office management is deplored, and its hurtful influences recognized by the higher officials of the telegraph, the difficulties met in the way of effecting improvements appear to be many, and if not insurmountable, are, at least, not easy to overcome. Embarrassment to the superintendent, earnestly seeking proficiency, arises too often from the fact that managers are deficient in enforcing order and maintaining proper discipline within the sphere of their jurisdiction. The desirability—nay the necessity of keeping a telegraph office neat and clean, a fitting and attractive place in which to invite the public to transact its telegraph business should be obvious to any perceptive mind. Duty to employing interests demands it; a proper sense of self-respect should dictate it.

First impressions count for a good deal. The appearance of a well-kept room, with polite, attentive and well-informed persons in attendance, offers a concrete example, at least at the outset, of what should constitute a befitting telegraph office, one calculated to influence, win and eventually hold custom. Patronage is what we are seeking. What brings business to our doors, especially if it comes our way spontaneously, obedient to and following a natural trend made possible by attention, by good service, by the courtesy shown in the numerous ways familiar to the well-bred gentleman, always so agreeable to the recipient, stamps the head of the office as

possessing at least some of the desirable qualities of management. Then, if in addition to those external exhibitions of fitness, the manager pursues a systematic and prompt handling and care of all records and files of his office, so that he can at any time make a clear and satisfactory report of conditions to his superior officer, another and a highly important measure of capacity will have been reached in his managerial aptitude.

The messenger service is an important auxiliary to the telegraph. Its hurrying representatives come in constant touch with the public at places of business, in the home, etc., and in the conduct and personal appearance of its individual members, the telegraph office from which they emanate, is affected one way or the other, according to the personnel, more vitally perhaps than many managers will be inclined to admit. Cleanliness of person, neatness of uniform, greater gentlemanliness of deportment, are essentials that every manager might materially promote if proper discipline was strictly enjoined. We are well aware what objections might be argued in this case, but the generic proposition nevertheless remains unaltered. The maintenance of careful and well-directed discipline is requisite to the moral and business welfare of every office, and its proper observance would exercise a tendency to raise the standard, not only of individual offices, but of the service at large.

The development of executive ability in the individual should proceed contemporaneous with the acquirement of a broader knowledge in telegraph engineering. The possession of both attributes would result in making the ideal manager of the future. More than this, such managers would be establishing themselves in the direct line of promotion. A beginning might well first be made by putting the office in order, then keeping it clean and making it attractive to the visitor. No one need be afraid that improved appearances will escape the observant eye of the superintendent, even if approving remark be withheld. A manager who conscientiously and intelligently elevates the standard of his office, starting with the physical act of "cleaning up," is working out a problem in the evolution of the telegraph from lower to higher conditions, which in its final rightful equation will carry its author along successfully in the impetus thus acquired.

Opportunities Still Exist.

Henry Clews, the New York banker, in a recent address, told Yale students that the fortunes of the future await the man who can check waste. He said:

"The pessimist is abroad preaching the gospel of discontent; and a favorite text is that the young man has no show or little chance to get on in life. Do not be misled or discouraged by such false doctrine. There never was a time when brains were at a greater premium than at present, nor courage, education, industry, and

energy more requisite. Men at the top of the ladder are eager to delegate part of their burdens to smart, enterprising assistants, and it is not necessary for you to remain privates long, even though you do not become captains of industry. Intermediate positions combine the requisite salary with the moderate enjoyment of life and lack the nerve-wrecking responsibilities of the top-notchers. Capital awaits the young man who will devise methods of reducing waste. Railroads seek time-saving inventions; manufacturers seek means of minimizing labor; industry seeks cheaper substitutes for many of the articles now necessary."

The Study of Telegraph Engineering.

In pursuance of the publication begun in the November 1 issue of Telegraph Age of a series of letters received from a number of expert authorities in the telegraph service, sent to us by request, in which information is imparted of a character helpful to young telegraphers ambitious for success and promotion, the following letter, additional to those already printed, has also come to hand. These letters have been written by men who themselves have climbed the ladder of promotion, who have experienced hard conditions similar to those which confront so many in the struggle of life, and yet who have overcome difficulties by intelligent application, sheer will force and dogged persistence, and who have finally earned what they have received.

Mr. H. C. Shaw, assistant electrical engineer of the Postal Telegraph-Cable Company at San Francisco, Cal., takes up the subject under date of October 23. He writes:

In my opinion, to be successful in the electrical line of the telegraph it is requisite to have a thorough theoretical knowledge of the subject. To acquire this considerable study is indispensable, and in the case of a young operator whose time is chiefly taken up by his duties, the studying will necessarily have to be done during spare moments. In my own case, I found a great deal of help in *Maver's American Telegraphy* and also in a correspondence course in electrical engineering which I went through. In the meantime, while the studying is being done, no opportunity to improve in the practical side of the subject should be overlooked.

Opportunities in the Telegraph Service.

The manager of a telegraph office in the West, writing under date of Nov. 5 to renew his subscription, takes occasion to refer in approval to the editorial replies to communications received from operators expressing dissatisfaction with the service, recently appearing in Telegraph Age. What he says is so apropos to the general subject that, suppressing the name, we print his letter in full, although not written for publication. Here is what he writes:

Your two editorials regarding opportunities in the telegraph service, one in the September 16 issue, the other in that of October 1, answering two voices of discontent, interested me very much. I was partic-

ularly impressed with a remark contained in the letter printed at the latter date in which the writer, in referring to himself, said: "I consider myself at thirty years of age a pretty fair operator, but there is no promotion in sight that I can make out, and that being the case I may ask, 'What's the use?'"

Our ages are nearly the same. I am twenty-nine, one year his junior. I have no wish to appear egotistical, but there is a certain analogy between us which has appealed to me strongly. Your correspondent whom I have quoted has no one to blame but himself, according to my way of thinking, for the circumstances of his condition, of which he complains. This I know from experience. I have only myself to thank for what share of success has come my way, and I want to tell you about it. Your articles are splendid and tell the exact truth. They have helped me. There is a future, I believe, in the service for all who will try for it. I mean earn it. For over a year now I have been manager of a commercial and railroad relay telegraph office. Six men are employed here besides a wire chief, covering 300 miles of road. Nine wires are operated from this office. I have endeavored to fit myself for my work by study and application. I am not where I am as the result of "pull;" I have worked hard for all I have gained. At twenty-six I held a good position in the railroad telegraph service; was then promoted to be night chief, and after two years was appointed to the place I now hold. My pay is over \$100 per month, so you see I am perfectly independent. The trouble with so many operators is that they are afraid they will do too much work for the pay they receive; the tendency to loaf rather than to improve time by studying the technical side of the profession is noted everywhere, and with disaster to the individual.

I may add that we are always on the outlook for bright men for operators. If competent they will surely be advanced. It is up to them to show what they are good for and to qualify for better positions and pay.

International Conference on Electrical Units and Standards.

The International Conference on Electrical Units and Standards which met in London in the rooms of the Royal Society, Burlington House, on October 12, concluded its meetings on October 21. Our report, published November 1, covered the two dates of October 12 and 14. Resuming its sessions on October 16, the conference, according to the London Electrical Review, first considered the interim report of the technical committee. Dr. Glazebrook, as chairman of the committee, moved, and it was agreed, "That the Technical Committee be authorized to issue, as an appendix to the report, notes detailing the methods which have been adopted in the standardizing laboratories of the various countries to realize the international ohm and the international ampere and to set up the Weston normal cell."

It was decided, on the recommendation of the Technical Committee, not to alter the length of the mercury column in the definition of the international ohm from 106.300 centimeters to one meter.

Dr. Glazebrook then stated that it had been referred to the Technical Committee to consider whether the two zeros following the eight in the amount of silver deposited per second should be altered to any other figures, and if so, what figures. When the Technical Committee came to

consider this, considerable differences of opinion arose, and it had been thought better to refer the matter back to a plenary meeting of the conference. The difficulty seemed to be that the international units were not identical with the C. G. S. units. This difficulty would still remain if the international units were only defined to four figures. The conference would be a failure, and would neglect to answer one of the important questions put to it, if it did not definitely fix the international units.

The president said that Resolution VI.: "The international ampere is the unvarying electric current which, when passed through a solution of nitrate of silver in water, in accordance with the specification attached to these resolutions, deposits silver at the rate of 0.00111800 of a gramme per second," was proposed and seconded and before the meeting twenty-one countries voted in favor of the resolution, and three, namely, France, Italy and Canada, against the resolution, out of twenty-four countries present and voting.

The conference next considered Resolution II., and it was resolved that the words "for purposes of trade and commerce" should be deleted, and the words "for the purpose of electrical measurements and as a basis for legislation" be substituted, the resolution then reading: "As a system of units representing the above and sufficiently near to them to be adopted for the purpose of electrical measurements and as a basis for legislation, the conference recommends the adoption of the international ohm, the international ampere and the international volt defined according to the following definitions."

Twenty-one countries voted in favor of Resolution II., and three, America, Belgium and France, against; twenty-four countries being present and voting.

Dr. Glazebrook then proposed to add an additional resolution: "That the ohm is the first primary unit," and it was accepted unanimously.

The conference proceeded to consider the steps necessary to secure uniformity of the standards in future. Professor Warburg moved "That the conference approves generally the draft scheme to establish a permanent commission to secure uniformity of administration in relation to electrical units and standards in the future. The conference refers the draft scheme to the Technical Committee to consider details and to nominate the first members of the commission."

On Monday, October 19, on the reassembling of the conference, Professor Arrhenius moved that the respective governments be invited to take steps to establish an international laboratory, and this was adopted.

Resolutions defining the watt were adopted, and a series of resolutions relating to secondary or working standards were approved. The establishment of a permanent international commission for electrical standards was recommended, a committee of fifteen to be appointed, in the meantime,

by the president, to advise as to the organization of the commission and to perform other necessary duties in connection with the work of the conference, in co-operation with laboratories possessing the necessary equipment for precise electrical measurements. It was decided that steps should be taken with a view to combining future electrical conferences with the international conference on weights and measures.

The report shows that delegates were present from twenty-one countries, and also from the following British dependencies, namely, Australia, Canada, India and the Crown colonies.

The total number of delegates to the conference was forty-three. The conference and its Technical Committee each held five sittings. As a result of its deliberations, the conference adopted the resolutions and specifications set out in Schedule B, and requested the delegates to lay them before their respective governments with a view to obtaining uniformity in the legislation with regard to electrical units and standards.

The conference recommends the use of the Weston normal cell as a convenient method of measuring both electromotive force and current when set up under specified conditions.

In cases in which it is not desired to set up the standards provided in the resolutions of Schedule B, the conference recommends the following as working methods for the realization of the international ohm, the ampere and the volt:—

1. For the International Ohm.—The use of copies, constructed of suitable material and of suitable form and verified from time to time, of the international ohm, its multiples and sub-multiples.

2. For the International Ampere.—(a) The measurement of current by the aid of a current balance standardized by comparison with a silver voltmeter; or (b) the use of a Weston normal cell whose electromotive force has been determined in terms of the international ohm and international ampere, and of a resistance of known value in international ohms.

3. For the International Volt.—(a) A comparison with the difference of electrical potential between the ends of a coil of resistance of known value in international ohms, when carrying a current of known value in international amperes; or (b), the use of a Weston normal cell whose electromotive force has been determined in terms of the international ohm and the international ampere.

The duty of specifying more particularly the conditions under which these methods are to be applied has been assigned to the permanent commission, and, pending its appointment, to the scientific committee, to be nominated by the president, who will issue a series of notes as appendix to this report.

In Schedule B the resolutions were:

I. The conference agrees that as heretofore the magnitudes of the fundamental electric units shall be determined on the electro-magnetic system of measurement with reference to the centi-

meter as the unit of length, the gramme as the unit of mass and the second as the unit of time.

These fundamental units are (1) the ohm, the unit of electric resistance which has the value of 1,000,000,000 in terms of the centimeter and second; (2) the ampere, the unit of electric current which has the value of one-tenth (0.1) in terms of the centimeter, gramme and second; (3) the volt, the unit of electromotive force which has the value of 100,000,000 in terms of the centimeter, the gramme and the second; (4) the watt, the unit of power which has the value of 10,000,000 in terms of the centimeter, the gramme and the second.

II. As a system of units representing the above and sufficiently near to them to be adopted for the purpose of electrical measurements and as a basis for legislation, the conference recommends the adoption of the international ohm, the international ampere and the international volt defined according to the following definitions.

III. The ohm is the first primary unit.

IV. The international ohm is defined as the resistance of a specified column of mercury.

V. The international ohm is the resistance offered to an unvarying electric current by a column of mercury at the temperature of melting ice, 14.4521 grammes in mass, of a constant cross-sectional area and of a length of 106.300 centimeters.

To determine the resistance of a column of mercury in terms of the international ohm, the procedure to be followed shall be that set out in Specification I, attached to these resolutions.

VI. The ampere is the second primary unit.

VII. The international ampere is the unvarying electric current which, when passed through a solution of nitrate of silver in water, in accordance with the Specification II attached to these resolutions, deposits silver at the rate of 0.00111800 of a gramme per second.

VIII. The international volt is the electrical pressure which, when steadily applied to a conductor whose resistance is one international ohm, will produce a current of one international ampere.

IX. The international watt is the energy expended per second by an unvarying electric current of one international ampere under an electric pressure of one international volt.

One hundred and twenty-nine miles of new telegraph line has just been completed by the government between Valdez and Gulkana. This is a duplicate of the old line, which was inadequate to carry all of the business from Valdez and Gulkana. It connects at the latter place with the line to Fairbanks. In addition to the new line several changes were made in the route, especially through Keystone Canyon, where the wires now follow the new wagon road instead of going over the hill. Thirty men have been employed on this work all summer.

How to Secure a Patent in the United States.

BY H. G. WARD.

The American law provides that "any person who has invented or discovered any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement thereof, not known or used by others in this country, and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, and not in public use or sale for more than two years prior to his application, unless same is proved to have been abandoned, may upon payment of the fees required by law, and other due proceedings had, obtain a patent therefor." All patents are issued in the name of the United States of America, under the seal of the Patent Office, and are signed by the secretary of the interior and countersigned by the commissioner of patents. They are recorded, together with the specifications, in the Patent Office, in books kept for that purpose.

Fees and charges in taking out a patent are as follows: On filing each original application for a patent, \$15; on issuing each original patent, \$20; in design cases, for three years and six months, \$10; for seven years, \$15; for fourteen years, \$30; on filing each caveat, \$10; on every application for the reissue of a patent, \$30; on filing each disclaimer, \$10; on the granting of every extension of a patent, \$50; on an appeal for the first time from the primary examiner to the examiners-in-chief, \$10; on every appeal from the examiners-in-chief to the commissioner, \$20. Copies of drawings usually cost \$5 a sheet.

Thus the bare cost of obtaining a patent is \$35 for the government fee and \$5 for a drawing, but in cases of a complicated nature the total cost of the patent will be more. However, the government fees are the same in all cases. It should be borne in mind that the rules of practice of the Patent Office advise that the assistance of competent counsel will, in most cases, be of advantage to an applicant for a patent.

Application papers comprise the petition, specification, oath, together with drawing, which must be filed in the Patent Office together with the first government fee of \$15. As soon as the application is filed the applicant is protected against the grant, without his knowledge, of a patent of the same thing to another person. The petition, oath and specification must be written in the English language. From the viewpoint of the Patent Office it is desirable that all parts of the complete application be deposited in the office at the same time, and that all papers in the application be attached together.

Applicants for patents should not forget that the actual value of a patent is measured by the character of its claims. On this point a well-known patent attorney says: "While formerly the impression prevailed to a great extent that

the essential thing to insure protection was a patent of some kind, the manufacturing public has been educated to understand that the vital and all-important part of the invention is its claims. If the claims are narrow and restricted, the patent is comparatively worthless; on the other hand, if the invention is well covered by broad and comprehensive claims, it will be found that the patent is readily endorsed by manufacturers."

Before any inventor can receive a patent for his invention he must make application therefor, in writing, to the Commissioner of Patents, and must file in the Patent Office a written description of the same, and the manner and process of making, constructing and using it, in such full, clear, concise and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct and use the same. In the case of a machine, the inventor must explain the principle thereof, and the best mode in which he has contemplated applying the principle, so as to distinguish it from other inventions. The inventor must particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery. The specification and claim must be signed by the inventor and attested by two witnesses.

Inventors will do well to remember that a well-prepared specification and well-accentuated drawings will greatly expedite the allowance of an application by the Patent Office, as the examiner is thus relieved of annoyance and unnecessary work in the examination of the case. A case which is poorly and incorrectly prepared entails upon the examiner much study and extra labor in determining just what the applicant is seeking to claim. Loosely drawn specifications and inferior drawings naturally have a tendency to prejudice the examiner in his action.

An inventor has the right to call his invention what he pleases, provided he does not assume an already existing and popular name, to the prejudice of those who have preoccupied the name.

As a general rule, a single patent cannot embrace two devices which are wholly independent of each other, or embody distinct improvements upon unconnected machines. But where two or more devices relate to one subject or are connected in nature and operation, the courts have held that they may be secured by a single patent.

A patentee cannot claim in a patent the same thing claimed by him in a prior patent, nor cover what he omitted to claim in a prior patent in which the invention was described, unless he reserved the right to claim it in a separate patent, and seasonably applied therefor.

An inventor who makes any new invention and desires further time to mature the same may, upon the payment of the government fee of \$10 and \$5 for a drawing, file in the Patent Office a caveat setting forth the design thereof, and of its

distinguishing characteristics, and praying protection of his right until he shall have matured his invention. The caveat will be filed in the confidential archives of the Patent Office and preserved in secrecy. It will be operative for the term of one year from date of filing. If application is made within the year by any other person for a patent with which such caveat would in any manner interfere, the commissioner of patents will deposit the description, specification and drawings of such application in like manner in the secret archives, and give notice thereof to the person by whom the caveat was filed. If such person desires to avail himself of his caveat, he must file his description, specifications and drawings within three months from the time of notification. A caveat answers a double purpose, first, to give notice of the inventor's claim, and, second, to prevent a patent from issuing to another for the same thing.

Patentees and their assigns and legal representatives, and all persons making or vending any patented article for or under them, must give sufficient notice to the public that the same is patented, by fixing thereon the word "patented," together with the day and year the patent was granted. When this cannot be done, owing to the character of the article, it will be sufficient to affix a label to the packages containing the articles a like notice. Severe penalties are provided for falsely marking or labeling articles as "patented."

A joint patent may be granted for a joint invention. When an invention is the result of the combined mental operation of two persons acting together, as neither can claim to be the sole inventor, the invention is joint, and they are jointly entitled to a patent on the article.

The duration of a patent is 17 years.

It is quite impossible to state with any degree of certainty the time required to secure the allowance of a patent. As all the various divisions of the Patent Office are considerably in arrears in their work, it takes from two to four months to procure a patent. Of course, when there are interferences or other obstacles to overcome the time required to do this is still longer.

Every patent or any interest therein is assignable in law. There are three classes of persons in whom the patentee can vest an interest of some kind in the patent. The first is the assignee, who may have had transferred to him in writing the whole interest of the original patent or an undivided part of such whole interest in every portion of the United States. The next is the grantee, to whom is transferred the exclusive right under the patent to make and use, and to grant to others to make and use, the thing patented within and throughout some specified part of the United States. The third class embraces the licensee, to whom may be transferred a less or different interest than either the interest in the whole patent, or an undivided part of such whole interest, or an exclusive sectional interest.

In conclusion attention is invited to a decision rendered in 1892 by Mr. Justice Brown in the Supreme Court of the United States, in which the following statement appears: "The specification and claims of a patent, particularly if the invention be at all complicated, constitute one of the most difficult legal instruments to draw with accuracy, and in view of the fact that valuable inventions are often placed in the hands of inexperienced persons, to prepare such specifications and claims, it is no matter of surprise that the latter fail to describe with requisite certainty the exact invention of the patentee, and err either in claiming that which the patentee has not in fact invented, or omitting some element which was a valuable or essential part of the actual invention."—Western Electrician.

Copper-Clad Steel Wire for Line Work.

Attempts to combine in a single wire the tensile strength of steel and the conductivity and rust-resisting quality of copper have been numerous, such as the early process of depositing the copper upon the steel wire electrolytically and the more recent method of mechanically working a heavy sleeve of copper over a polished steel billet and then rolling the billet down and drawing it into wires of the desired gage. Objections offered to wire for transmission purposes made by these processes have been that in the former the copper coat was too soft to stand abrasion and in the latter the adhesion between the two metals was not great enough, despite the rolling and drawing, to prevent an infinitesimal film of air from remaining to start oxidation of the steel and finally cause the copper plating to flake off.

By a process recently perfected by J. Ferreol Monnot a homogeneous union between the two metals is brought about by applying a thick coat of copper to the outside of a billet of steel, while both are heated to a high temperature, thus really welding the copper to the steel. The heat drives out all air and allows the plastic copper to mix with the softened surface of the billet most intimately. Any desired thickness of copper can be applied according to the requirements and the proportionate thickness remains the same in the finished wire. After cooling, the coated billet is reheated and run through rolls to reduce it to rods and finally to wire of three-eighth-inch diameter. In the drawing mill this is then drawn down to wire of any size. The copper and steel draw down equally and the softer metal has the same thickness throughout. The rolling and drawing harden the copper so that it becomes very dense and in excellent condition to resist wear, and it is stated that so perfect is the union of the metals, even before rolling, that efforts to break the copper away with a hammer on a tongue made by sawing radially into the edge of a transverse section or disk cut from a coated billet have been unsuccessful.—Electrical World.

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The Military Telegrapher in the Civil War.

PART X.

(Concluded.)

The extra contribution for publication in this series of articles, received from Thomas H. Brooke, of El Reno, Okla., the first part of which appeared in the issue of November 1, is herewith completed:

The next morning General Wheeler's command returned south and sent a detachment over to Fosterville to gobble our two companies, while the main army rested on the main road. We were entirely surrounded before knowing the enemy was near us. The wire north was open. I wired Chattanooga that we were surrounded and attacked, but before I could reach the stockade the battle had begun, cutting off my retreat thereto. I left the office and crawled through weeds to an old building where government stores were kept. A flag of truce was sent and our men surrendered and were marched off as prisoners. I thought I was the lucky boy again and would get back and report the matter. All seemed quiet. Very soon I heard a roaring as of an approaching train, yet there was no train due. What could it be? It was the house standing beside me, an old wooden shell, which burned like a pile of shavings. I must move quickly or get burned. I crawled through weeds until I reached a rail fence. I did not dare climb it and expose myself. With my foot I pushed away a rail near the bottom and crawled through. I reached a corn shock and was parting it to crawl in for protection against heat and exposure when I heard the click from four guns pointed at me.

I was caught for the first time, and there was no way out of it. My captors did not say a word. I threw up my hands and walked right over to them, and said: "Hello, boys!" I preferred to be friendly then. They said: "What in h— do you want here? Who called you?" I said: "You signaled me to come and I did not want to argue the question." "Well, shell out" said a red-haired grizzly Texan, whose hair appeared never to have been combed or shorn since the war began and whose face had received applications of water but seldom. He stripped me of all personal effects, even to the last chew of tobacco, then, emphasizing his command by oaths, told me to mount behind him. Well, you ought to have seen that lean sharp-backed pony like a rail with the edge sharpened. I could see Wheeler's army apparently just starting to move forward on the main road. My man rode up under a shade tree and stopped with the remark: "Well, boys, let's get busy," at the same time looking up at a projecting limb. Two of the men were a rod or two in advance, the other beside us said, "Oh, come on!" and moved on slowly. My man had two heavy guns in his saddle front and his carbine strapped on his shoulders. I did not question their purpose. Every fiber of my body was nerve

and strength. I was naturally a strong boy, then about eighteen years old. I felt equal to the occasion and determined that the very moment a move was made to loose a lariat from a saddle, that moment I would wrench my man from the saddle by the long hair of his head, and with gun in each hand would get the four of them. My nerve was steady, never more so. With oaths and threats the man with whom I was riding said he would not carry me another inch. I was requested by one of the other men to get behind him, while my former custodian spurred his horse under a shower of oaths and threats and soon disappeared. I was turned over to the colonel of the 11th Texas Cavalry, by whom I was treated very courteously. He introduced me to General Joe Wheeler, who was also very courteous and questioned me somewhat in regard to the information given out of his movements, which I gave correctly. General Wheeler on learning that I was a West Virginian, said: "You should be with us." He finally asked whether I would prefer to lodge in prison or go with him and be true to them as an operator. I said: "You would not trust me, General." He said, "Yes, I would if you would consent. I do not believe you would deceive me." He paroled me finally, and sent me safely beyond camp under guard so that I would not fall into the hands of any more grizzlies.

After a very fatiguing march I reached Murfreesboro and from there went to Nashville, and being on parole feared to risk service where the same men might recapture me. I then went to Mannington, West Virginia, my former home, and after a few days' visit with my parents, I was employed for special service along the line of the Baltimore and Ohio Railway, when I was ordered to Martinsburg. Arriving there the sound of heavy firing was in the air. General Crook was being driven back by General Early. Very soon I ascertained that I was the only operator, railroad or commercial, in the city, for the boys had retired beyond the city limits. General Crook and staff soon arrived, and he and his aide-de-camp wrote a number of messages and left courier and horse for me with instructions to stay until the last horn blew, but not to get captured. The general, accompanied by his staff and operator, took a position on the north side of the railroad on a high point, and shelled the enemy, partially holding him in check.

I was intent on handling the very important telegraph business to and from Washington, and failed to discover the true condition of affairs about me, until finally, awakened to the fact that my orderly and horse had moved on, leaving me on foot and between two lines of battle, our rear having fallen back. The balls fell like hail, picking up dust from the street and sidewalk. I had a great dread of southern prisons and determined to chance once again another run for dear life. I had learned to run. A foxhound could scarce have caught me. Without a scratch I passed our line of battle under deafening cheers

from our men and reported to General Crook. Nearly thirty years after that event I met General Crook during his last tour of inspection at Fort Reno, Oklahoma, and referred to that experience. The General laughed heartily and said that he remembered it well, and complimented the war operators as possessing more than the average for bravery and faithfulness.

When Early made his raid into Maryland and attack on Washington, I was at Sandy Hook. I was ordered to report to General Lew Wallace at Monocacy Junction. The rebels had torn up the railroad track near Point of Rocks, which the engineer of the train in which I was traveling discovered in time to reverse the engine and save us from being wrecked in the canal. Our train was shot at and the fireman was killed. Every window in the coaches was shattered with bullets. We returned to Sandy Hook, but finally, by the assistance of a squad of our men, who cleared the way, we were able to reach our destination.

I went with General Wallace to Frederick City, where I met an operator who was just leaving with his family. He gave me his keys. General Wallace met Early in battle in sight of the city, but was compelled to fall back to Monocacy Junction. During the battle orderlies were busy carrying messages to and from my office, many of them being in cipher. I was rushed very much to keep my files clear about the time of the retreat, and as Early's left wing swung into the city, my orderlies narrowly escaped capture, and, without having been given notice of the situation, I found myself again in the midst of the boys in gray. I dumped all messages and instruments into the cellar and walked out to meet a Confederate patrol half a block from my office on the lookout for Yankee stragglers. "What street is this?" I was asked. "I do not know, I am a stranger here myself," I replied calmly. "Where from?" came the query. "From Baltimore," I answered with all the innocence I could force into my countenance and voice. "I am a clerk from Smith's shoe store on the corner of Baltimore and South street, sir. I came here hoping to find a friend of mine who enlisted at Richmond a year ago and is with General Early. His name is _____." His mother is at the point of death and requested me to search for her only boy that she might see him again. "Sirs, can you help me to find him?" They started on before I had scarce finished my tale, but seemed somewhat touched by my story. Again and again I met the various patrols searching the city, but answered all questions with the same plea and with like result. Finally I discovered a party of Confederate officers on top of the Dill House, then the leading hotel, with field glasses, watching the battle at Monocacy. I ventured up, and after making some inquiry, asked permission to look through their glasses, which I did and could distinguish the fight. Shortly after this a troop of United States

cavalry routed the whole gang, but not until they had ravished the stores of much valuable merchandise.

I accompanied our troops to Monocacy Junction, found the earth strewn with dead and wounded and the bridge across Monocacy River burned. I crossed on the eight square irons, one of the girders of the bridge, heated from the burning wood until my feet were badly blistered. The smoking chunks of ties almost stifled and blinded me, and it was with difficulty that I kept from falling into the deep water beneath. Several officers were present who preferred to swim rather than to pass through the ordeal. I found the wires destroyed, and followed up towards Baltimore, hoping to reach a live wire to report results, but failed.

This concluded my war experience. I went to Baltimore, worked in "B" office for a short time and in Washington several months under "Ham" Young, lately deceased, then assistant manager of the United States Telegraph Company, at 450 Fifteenth street, until after the assassination of President Lincoln.

The Telegraph in Brazil.

The telegraph system of Brazil is divided into eighteen districts of at least 600 kilometers of line, each of which is controlled by a chief engineer. The system in 1907 was composed of 29,475 kilometers of line and 53,602 of wire. If the lines owned by railway companies be included, the figures are 66,264 kilometers of line and 134,701 of wire. There were 513 stations belonging to the government, and including railway stations the number was about 2,000. The government has concluded arrangements with the railway companies for united working. The rights of foreign companies are limited to cable stations, of which there are nine, and to stations along the Amazon River, making a total of seventeen stations. All important centers are telegraphically connected. The federal government is undertaking the work of connecting the Amazon territory telegraphically with the southern territory, but owing to the nature of the ground to be traversed the work will take a long time. The length of the line will be about 2,000 kilometers. The total telegraphic business of the country amounts to about 4,500,000 telegrams, containing 67,500,000 words. In Brazil the telegraphic system is not regarded as a source of revenue to the treasury, the main object of the government being to facilitate as much as possible the use of the telegraphs, and to connect all the most distant parts of the Republic. Baudot instruments are being largely introduced, and are already in use between Rio and St. Paul, Bahia and Pernambuco, as well as between Rio and Rio Grand do Sul and other places.—*Journal Télégraphique.*

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Opportunity.

Mr. C. B. Arrington, superintendent of the Postal Telegraph-Cable Company, at Nashville, Tenn., has issued the following circular letter addressed to all managers of his company in Kentucky and Tennessee. It bears the title of "Opportunity," and speaks for itself:

"Some managers wonder why they never get promotion. The kind of managers who never get ahead are those who pay no attention to the tariff book, rules, and letters of instruction; who throw a circular letter aside, and later have to ask us for the information; who never learn to make up their reports correctly, throwing additional work on this office; who don't pay prompt attention to error cards, and numerous other details of their business. They never think about how long it takes a messenger boy to come and go, or look to see if the message he took out was receipted for. It never occurs to them to personally check up the list of boxes on their call circuits to see among other things if they are placed in the most convenient spot for the customer. We always try to promote our employes, everything else being equal.

"The following article, which appeared in Telegraph Age for October 16, supplies additional reasons for careless employes who are wondering why they never get ahead:

"If I had a chance, my position in life would be a better one,' is what one hears quite a number of men say. In some cases it is true; in others it is not. Too many permit the chance to pass them by; or, when the chance comes their way, they find themselves poorly equipped for the chance. A young man learns how to telegraph, how to manipulate the levers of a railroad signaling tower. The years pass by and he has no knowledge of anything else, except how to work the telegraph key and read the Morse language as it is clicked from the instruments. Switchboards are a mystery to him, and if called upon to make a 'cross connection' he is unable to do so. If his instruments or battery gets out of order he calls for a repairman and learns naught from him which might prove valuable in an emergency."

"The best way to get ahead is this: Post up and keep posted on your business. Wake up. Pay attention to what is told you. Save all circulars, rules and correspondence.

"No man can obtain promotion if he does not merit it. Seniority of service is of no value when a better position is in sight, unless one is competent to fill the position. Reliance on 'pull' is insecure, because such influence is liable to be lost through death, or the 'pull' losing its power. The best 'pull' is what one has stored away in the brain; what the hands have been taught to do. Eating so-called brain foods for breakfast, traveling the same old daily rut and growling about promotion not coming your way, wins nothing. We cannot all become presidents of a railroad, but every man ought to try to

work himself up to a higher position. To succeed, he must know something more than his associates, because that superior knowledge lessens the number of his competitors. Be prepared to grasp 'Opportunity' when it knocks at your door.'"

Mr. Jesse Hargrave, also a superintendent of the Postal Telegraph-Cable Company, and who is located at Birmingham, Ala., occasionally orders marked copies of Telegraph Age sent to managers, chief operators and line repairers in his district, whether they are subscribers or not, calling attention to important articles, the study of which he deems essential as tending to increase efficiency in the individual and the telegraph service in general.

Mr. S. M. English, general manager of the Postal Telegraph-Cable Company of Texas, is still another telegraph executive who likewise makes use of the instructive articles appearing in these columns, directing attention to the same among the working forces of his company as a source of educational influence.

The Western Union Telegraph Company has also recognized the value of the utterances of Telegraph Age as expressed in its educational articles. Colonel Robert C. Clowry, president and general manager of the company, frequently orders copies sent broadcast to individuals and offices where it is believed they will do the most good.

Telegraph Operator Surprised by Talking Telegraph Relay on Compositing Line.

Occasionally apparatus not at all related in appearance to the ordinary telephone receiver is found to lend itself to the reproduction of speech. Stories are current in some telephone exchanges of instances where magneto bells have been heard to talk. With the increase in the use of composited telegraph lines, over which service is given to railway employes, reporting of cases where telegraph relays are said to talk is becoming more and more common. One of the interesting occurrences of this kind recently happened in the office of the Grand Trunk Railway System at Keene, Ont. H. Nelson, the company's agent, was sitting near his instruments one night when he heard voices as of people talking. Suspecting that there might be some trouble with the telephone which caused sound to be reproduced in the receiver, even though that instrument was on the hook, he lifted it, but as the voices had apparently stopped, decided it did not come from that source. He located the sound, on its reappearance, in the relay of one of the telegraph instruments at the other side of the room. He reports that he could hear conversations distinctly, one man saying, "How are you getting along with the wall?" the other replying "Not bad." He reports that voices were very distinctly heard, and on subsequent occasions he has heard conversations which were reproduced by the relay with clearness.—Telephony.

The Creed Telegraph Printer.

This instrument completes the Creed printing telegraph system, in which the message is first treated by an operator at the Creed keyboard perforator, producing a paper tape with perforations representing the message in the Morse code. This tape is identical with the Wheatstone perforated tape, and is passed through a Wheatstone transmitter, which sends to line the desired long and short currents. At the other end of the line the received signals actuate the Creed receiving perforator, which reproduces an exact copy of the transmitting slip. This received slip is then passed through the Creed printer, reproducing the message in Roman characters on a paper tape, which is then pasted to a telegraph form or blank. The instrument can print reverse upon the tape, so that when the tape has been pasted upon the blank form a true face copy of the telegram may

The perforated tape is fed forward letter by letter in a guide-way in front of a series of ten pairs of selecting needles, one needle of each pair being mechanically connected to a series of ten slide-valve plates. Each of these valve plates can be made to occupy one of two positions, thus providing a number of different combinations, every one of which opens one complete and particular passage through the ten slide-valve plates. Air under pressure can thus be admitted to any one of a number of small cylinders, each containing a piston acting on the end of a lever connected to a type bar.

The perforated slip is fed forward by a star wheel fitted to a spindle carrying a toothed wheel, which is rotated as required by the movement of a rack. The rack is given a vertical motion for feeding purposes, and a sidewise motion for acting on any slide valves that may have been se-

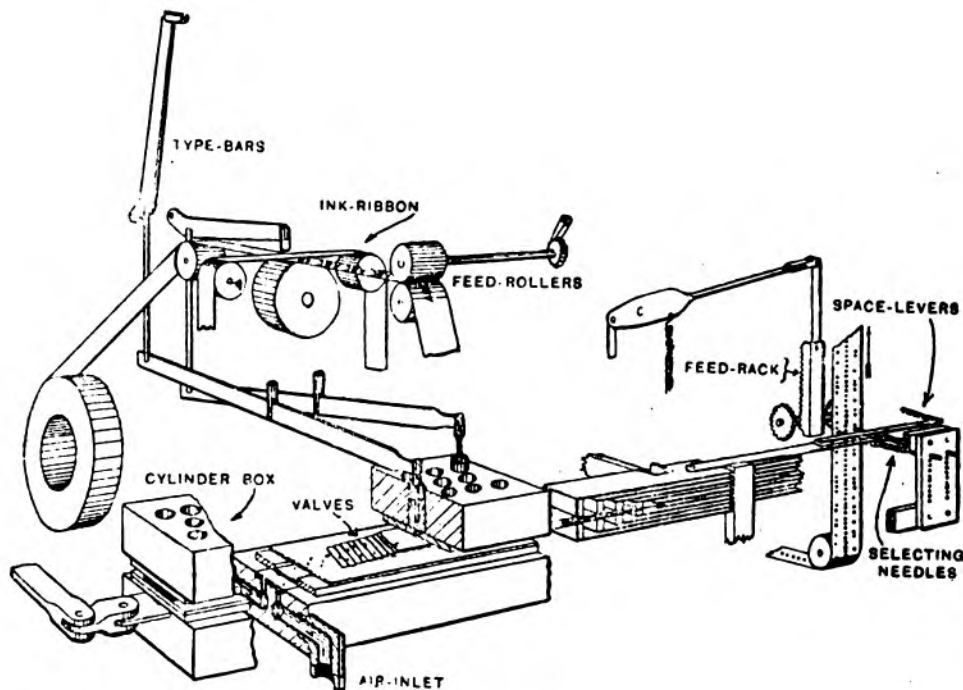


DIAGRAM SHOWING ACTION OF PRINTER.

be obtained upon an ordinary opaque form by means of the damp-copying process. This form can then be sent out for delivery, and the original tape retained at the telegraph office.

The received perforated tape can be run through the printer several times, and, in addition, can be utilized to re-transmit the signals to any other line equipped with Wheatstone apparatus.

A diagrammatic explanation of the action of the printer is given in the accompanying illustration.

The received perforated slip is passed into the machine at A, as shown in the figure, and out at B; while the slip on which the printing takes place is drawn by a pair of feed-rollers from the roll on the upper left-hand side, between the connecting rods of the type-bars and over the printing platen.

Its movement is obtained from the camshaft of the machine, which is belt-driven from a small electric motor. The extent of the vertical movement is limited by the distance to the first space signal, that is to say, the length of a letter. To provide for this limit there is a group of ten space levers normally in the path of the rack, and preventing its downward movement. Each space-lever is also in the path of one pair of selecting needles, and when either needle of a pair passes through a perforation, that particular space lever is moved out of the path of the rack. Hence, with any letter or figure of the international Morse code there is a clear downward path for the feed-rack until it reaches a space signal. A sidewise movement is then given to the rack, putting it in gear with the toothed wheel. Next, the rack is given an upward

motion, causing the toothed wheel to turn and the perforated tape to be fed upward by the amount of the particular letter that has just passed. The rack is then moved sidewise again, clear of the toothed wheel, ready to descend as far as the next space signal.

The slide valves made of thin sheet-steel have each a hinged extension whose further end is arranged to take up the movement of the corresponding selecting needle in its motion to and from the perforated tape. At the same time, the extension is free to move in a direction at right-angles to the needle. Each valve-extension is provided with a shoulder which comes into the sidewise path of the feed rack when that particular extension has been selected. At the correct moment, determined by the position of a cam on the main spindle, the rack is moved sidewise, and engaging with the shoulders of the valve extensions which have been selected, moves the corresponding slide-valves into their second position. Another cam opens a main valve, admitting air under pressure to the slide-valve chamber, whence it passes through the ten valve plates by the one hole available in that particular setting of the valves, forces up the particular piston and prints the corresponding letter. Another main valve is then opened to allow the air to escape, and the selected slide valves are returned to their normal position.

Although more than the required number of selecting needles for any particular letter may pass through the tape, only the proper number of slide valves are acted upon by the rack, on account of the spacing lever preventing the rack descending beyond the required amount.

It will be observed that there are twenty selecting needles, but only the ten acting on the lower row of holes in the perforated slip are attached to valves; the other row of needles is not necessary for selecting purposes, but is required for shifting the space levers for the first portion of a dash signal.

The machine prints satisfactorily at any speed up to one hundred and twenty-five words per minute; but this is not the maximum, it being considered possible to reach one hundred and fifty with the present form of machine, and this will probably be increased with improvements in details.

The chief claim for this system of telegraph printing is the undoubted advantage obtained by using the well-known Morse code, entailing no alteration of existing telegraphic apparatus nor need for operators to learn a new code. Intermediate stations, such as repeater stations or testing points, can check the passage of the signals without any knowledge of the Creed system, and can make all necessary adjustments without reference to the terminal stations. The system, being an addition to the Wheatstone system, can be introduced gradually without disarranging any of the present Morse methods.—London Electrical Review.

In reply to a letter addressed to Mr. F. G. Creed, at Glasgow, Scotland, the inventor of the Creed system, by the Editor of Telegraph Age, asking

him whether the pasting of the printed tape on blank forms did not involve a needless loss of time, thereby constituting a defect in his system, he writes:

"With regard to the new printer, I may say that it is a mistake to suppose that pasting of the printed tape involves delay. On the contrary, it saves time. You will readily understand how a page-printing machine, involving the necessity of frequent stoppages for change of line, must not only be more complicated, but must work very much faster (to turn out a given amount of work in a given time) than a tape-printing machine which runs steadily on. Thus, I can turn out a steady one hundred words per minute with my machine right through the day. The tape is drawn through an automatic gummer as it issues from the printer and the messages can be ready for delivery within half a minute from the time they left the transmitter at the distant station. There is no delay at all in pasting even at one hundred words per minute. A very smart man could probably paste quite safely at one hundred and fifty words per minute. Press copies of the messages are taken in the usual way.

"I may say that by a recent improvement of the receiver, I have been able to punch perfectly at a speed of two hundred and twenty-five words per minute from signals received on an ordinary post-office telegraph relay under the control of an ordinary Wheatstone transmitter. I send you a piece of tape so punched. It measures twenty-two and one-half feet in length, and was punched in half a minute, and contains, according to standard measurement, one hundred and twelve and one-half words. This speed may seem to you almost impossible, but I assure you there is no mistake about it. I ran the stuff myself, and measured it most carefully, and the machine was actually punching at the rate mentioned. That means that when running dots (i. e., plain reversals) it punched nearly two hundred holes per second.

"The Creed system is at work in the British post-office on only two main wires, viz., Newmarket and London to Manchester, and London to Birmingham, Manchester and Liverpool. On the first wire London and Newmarket run news work to Manchester, where it is repunched on the Creed puncher, and retransmitted to various out stations. On the second wire London runs news work to Birmingham, Manchester and Liverpool, which receive simultaneously, and these places in turn run to London and to each other. The receiving station, or stations, in each case receives on a Creed perforator, and print the stuff, sometimes in manifold, for delivery. The printer used on these wires is known as the Murray-Creed, being a combination of the Creed and that of Donald Murray. The line speed maintained is one hundred words per minute. A similar circuit is installed between London and Copenhagen on the Great Northern Telegraph Company's lines, where London runs to Newcastle-on-Tyne at ninety words per minute, where it is punched on a Creed receiver, and then retransmitted across the North Sea to Frederica.

Denmark, where it is again retransmitted to Copenhagen, there being received on a Creed receiver, and printed for delivery on a Murray-Creed printer. This, as well as the postoffice installation, has been working satisfactorily for nearly two years. The Great Northern can receive Wheatstone on the Creed receiver, across the North Sea cables, at sixty to ninety words per minute, and at Newcastle-on-Tyne there is one of the new Creed printers, the first one so far introduced, which is used with great satisfaction for printing messages for delivery at Newcastle. The Great Northern has, of course, the heaviest kind of code traffic.

"Creed receivers are installed for retransmission purposes at the Valentia station, Ireland, of the Anglo-American Telegraph Company, where traffic is received at from seventy or eighty to one hundred words per minute from London on a Creed receiver, the slip from which is used to control a machine which punches another slip according to the cable code, which slip is then broken up for transmission over the various cables. A similar system has been installed at Valparaiso, Chili, in order that the signals received in Buenos Ayres may be automatically punched at Valparaiso, and translated for transmission over the cables of the Central and South American Telegraph Company. I have not been able to learn whether this installation is working satisfactorily or not, but that at Valentia has been working perfectly for over a year.

"Creed receivers are also used for retransmission purposes at Bombay and Calcutta, India."

How the First Report of a Railroad Accident Went Over the Wire.

"I sent over the wire the first report of a railroad accident the telegraph ever carried, and without being a telegraph operator at that," said Wilmot M. Vail, an octogenarian citizen of Port Jervis, N. Y., to a New York Sun reporter. "The original Cornell telegraph line opened at Goshen its first office in this state west of the Hudson. This was in 1849. The office was in my father's book store. I was a clerk in the store. My brothers, Hector and Nathaniel, soon learned to operate the instrument, and Hector became the first regular operator. The Erie Railroad put its telegraph line in operation early in 1851. Its wires entered the Cornell offices. Hector Vail was sent to Port Jervis as operator for both lines. Nathaniel Vail took charge of the Goshen office.

"I had not learned to operate the telegraph instrument, but from hearing and seeing my brothers working at it I had obtained some little insight of its mysteries. One day in 1851 my brother Nat went to New York. That day the westbound train known as the Day Express ran off the track three miles east of Goshen and into the ditch. Although the Erie had its own telegraph line it had not yet begun to utilize it for running trains on telegraphic order.

"An hour and more having passed beyond the time the day express should have arrived at Port Jervis, people there began to want to know what

was the matter with it, and Hector Vail began to call up Goshen. He didn't know that Nathaniel Vail was away. We knew at Goshen all about the accident to the train. I heard the call on the instrument, but telegraphing not being in my line I let it call. The calling kept up at intervals for an hour or two, and thinking the matter over, I concluded that it was perhaps Hector Vail wanting to find out what had become of the day express, which was still off the track, so I thought I would answer the call myself.

"Studying the Morse alphabet a while, I pounded off on the keys as I best knew how the news about the wrecked train. I was a long time doing it, and the message I sent must have arrived at the Port Jervis end of the wire in a somewhat irregular and jumbled form, for although Hector Vail got the news he had been hours clamoring for, he sent back this forcible but ungrateful query:

"What d— fool sent this in?"

"And that's the way the first report of an accident on the Erie or any other railroad was sent over the telegraph wire.

"Recalling those days of pioneer telegraphing, I remember that Ezra Cornell was so poor after he got his line to working that when he came to Goshen to look over the property, if there was no money in the office from telegraph tolls my father would advance him some, so that 'Old Bones,' as he was irreverently called, might get something to eat. A few cakes, a slice of bread or a morsel of cheese sufficed him. Yet that struggling pioneer telegraph line was the source of his millions, and the foundation of the famous university that bears his name."

Book Review.

An interesting contribution to the literature of wireless telegraphy, considered as a study from a mechanical, historical and scientific point of view, has been made in the new volume entitled "Radio-Telegraphy," by C. C. F. Monckton, an English electrical engineer, of which the D. Van Nostrand Company, New York, are the American publishers. The subject, which is clearly and intelligently, yet simply, treated, is developed from its fundamentals in logical and unfolding sequence, and affords the student and general reader who is looking for information, an excellent conception respecting a system of telegraphy of such growing importance as the wireless. In the appendix will be found a résumé of the articles of the International Radio-Telegraph Convention of 1906, at Berlin, Germany. This volume of 272 pages is well printed on heavy paper, and is copiously illustrated, more than 170 figures appearing. It will be sent to any address, carrying charges prepaid, on receipt of price, \$2.00. 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 Detroit, Mich., June 23, 24, 25, 1909.
- Commercial Cable Company meets the first Monday in March, at New York.
- Gold and Stock Life Insurance Association meets the third Monday in January, at New York.
- Great North Western Telegraph Company meets the fourth Thursday in September, at Toronto, Ont.
- International Association of Municipal Electricians meets at Atlantic City, 1909, at a date to be named later.
- Old Time Telegraphers' and Historical Association, will meet at Pittsburg, Pa., at a date to be named later.
- Postal Telegraph-Cable Company meets the fourth Tuesday in February, at New York.
- Telegraphers' Mutual Benefit Association meets the third Wednesday in November, at New York.
- Train Despatchers Association meets in 1909 at Columbus, O., at a date to be determined upon.
- 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.

Orders for books on telegraphy, wireless telegraphy, telephony, all electrical subjects, and for cable codes, will be filled by TELEGRAPH AGE on the day of receipt.

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The Railroad.

During the week of the Missouri State Fair trains of the Missouri Pacific system, of which E. A. Chenery, is superintendent of telegraph, will be operated between Sedalia and the state fair grounds by telephone, the first test of this system in Missouri.

Mr. J. D. Morton, of Toronto, Ont., chief accountant of the Canadian Northern Railway, has been elected general auditor of the same system in addition to his duties as chief accountant. Mr. Morton began his career as a messenger and telegrapher and was a knight of the key at various points in Canada and in the United States for over twenty years.

Mr. R. R. Jamieson, general superintendent of the central division of the Canadian Pacific Railway system, with headquarters at Winnipeg, Man., has resigned to become president of the Merchants' Fire Insurance Company and other insurance interests. Mr. Jamieson began his career as a telegrapher and advanced through the various grades of the railway service to the high position he occupied at the time of his resignation.

The Delaware, Lackawanna and Western Railroad Company are preparing to put in early operation a telephone train despatching circuit covering the Morris and Essex division west from the Hoboken terminal. When completed this new despatching system will extend unbroken from Hoboken to Buffalo, a distance of 410 miles. This work, in forwarding which so much energy has been displayed, has been conducted under the supervision of L. B. Foley, superintendent of telegraph.

The Grisson Rectifier.

An improved type of this alternating-current rectifier, with aluminium electrodes, which was first brought out in 1903, is here described. The former glass cell has been replaced by an iron cell in order to permit air cooling in place of the original method of cooling by water, which proved impracticable. It has also been found of advantage to give the aluminium electrodes an inclined position, so as to permit an easy escape of the hydrogen bubbles. The electrolyte consists of a solution of specially prepared bicarbonate of soda in pure water in proportions of one to sixteen parts. The rectifiers are furnished with electrodes already formed, but they have to be "polarized" before being put in operation, that is, the aluminium electrodes have to be provided with a coating of oxygen bubbles. Tables of the operation of a rectifier on a 110-volt alternating-current circuit of fifty periods per second under varying loads indicate a maximum efficiency of seventy-five per cent., and of seventy per cent. on a 120-volt, fifty-period, polyphase circuit. By connecting the cells in series or multiple they may be used for any tension or current intensity and adapted to any purpose.—Abstracted and translated by the Electrical Review, Chicago, from *Elektrotechnische Zeitschrift*, Berlin.

The New Skirrow Word Counter.

A new word counter, the coming of which has so long been awaited, and for which such constant inquiry has been instituted, has at last made its appearance. This little device, which is of so much value to the operator that the inability to procure one of its kind, as has been the case ever since the manufacture of this class of instruments ceased, has caused decided inconvenience. The new instrument will be known as the "Skirrow Word Counter," it being the invention of John F. Skirrow, associate electrical engineer of the Postal Telegraph-Cable Company, New York. It is manufactured by J. H. Bunnell and Company, of New York, whose reputation for turning out strictly first-class work entitle all articles of their manufacture to rank among the best of the kind produced. At present this counter as manufactured is furnished with attachments to fit the Remington typewriter only, up to and including their No. 9 machine.

The Skirrow device is circular in form; it differs in design from the old, and is a neat and well-finished affair. Its mechanical simplicity of construction enabling it to perform its work of registration in a natural and satisfactory manner, free from all complication, and such, moreover, as to render it practically impossible to get out of order, will recommend it very generally.

The counter consists of a single interior wheel, bearing on its periphery the numbers one to fifty, specific disclosures of which are made through an opening in the outer case caused by the automatic working of the attachment, the last counted word alone being visible. While this initial record of numbers, limited to fifty, is sufficient to register a full enumeration of words included in the average message, nevertheless those overrunning that limit are also counted, the mechanism repeating itself simply, and so on ad infinitum.

As the Skirrow word counter is the conception of a practical commercial telegrapher, one who is familiar with the needs of the craft, it may be said that this latest production, overcoming objections observable in previous instruments, will meet all the requirements of the telegraph operator seeking a registration device with which to count the message words that he receives on the typewriter. Another point in favor of this new counter lies in the fact that it is strongly made, sufficiently so to withstand the hard usage such instruments, which in the past have been of more delicate construction, are frequently subjected.

The price of the Skirrow word counter is \$3.00 express or mail charges prepaid. Address all orders to J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

"Pocket Edition of Diagrams," etc., by Willis H. Jones, electrical editor of Telegraph Age, embodies more practical information concerning the telegraph than any book or series of books hitherto published. See advertisement.

Committee Report Respecting Trawling Injuries to Cables.

The report of the English committee appointed to inquire into the causes of, and to suggest remedies for, the damages done to submarine telegraph cables off the Irish coast has been issued. The committee was appointed in July last, and was constituted as follows: Sir J. C. Lamb, C.B., C.M.G., formerly second secretary to the Post Office, chairman; W. R. Culley, I.S.O., submarine superintendent in the engineering department of the Post Office; Commander G. C. Frederick, R.N., professional member of the harbor department of the Board of Trade; C. E. Fryer, I.S.O., superintending inspector of English fisheries; W. S. Green, C.B., chief inspector of Irish fisheries; Commander G. M. Marston, R.N., of the hydrographic department of the Admiralty, and F. J. Brown, secretary's office, General Post Office, secretary.

Eight meetings were held in London, and the cable companies on whose behalf evidence was tendered, included the following: Anglo-American Telegraph Company, Commercial Cable Company, Western Union Telegraph Company, Eastern Telegraph Company, Great Northern Telegraph Company, Telegraph Construction and Maintenance Company, India Rubber, Gutta Percha and Telegraph Works Company, and Siemens Brothers and Company.

The report, which is lengthy, deals with the committee's consideration of the evidence, which is summarized under two heads: First, Is injury caused by trawlers? and, second, What steps can be taken to prevent injury?

An English contemporary in its report of the proceedings says: The committee endeavored to ascertain why there was comparatively little complaint of injury to cables in the North Sea. The reasons generally given were that the majority of the cables in that sea were of a heavy type, that the sea bottom was even, and that the cables had a tendency to sink into the sand. The committee think these reasons may be accepted, but they also think that the comparative immunity of the cables may be due to some extent to the attention which the owners of trawling vessels on the east coast have given to the construction and maintenance of their trawling gear. This attention is the outcome of friendly representations made to them by the Great Northern Telegraph Company, and also of the harmonious relations between the fishermen and the cable staff of the Post Office.

Both the Anglo-American Telegraph Company and the Commercial Cable Company asked for the prohibition of trawling in an area to the west and southwest of Ireland, which according to the marked chart submitted by the Anglo company embraces about 3,400 square nautical miles: the other Atlantic cable companies in general terms support this request. The Anglo-American company suggest the following alternatives: first,

that trawl-owners should alter the design of their trawls so that they may ride over the cables and not engage them; and, second, that they should be compelled to trawl in the same direction as the cables lie, and not across them. The first of these alternatives is referred to later; the second is not concurred in by the other cable companies.

The area indicated, the committee said, would not embrace the fishing grounds over which are laid the cables of the Western Union Telegraph Company, the Compagnie Française, the Eastern Telegraph Company, the Direct Spanish Telegraph Company, the Great Northern Telegraph Company, the Deutsch-Atlantische Telegraphengesellschaft, or the Post Office, and would exclude a portion of the Azores, Weston-super-Mare, and Havre cables of the Commercial company itself. It would leave quite unaffected the fishing grounds on the American side of the Atlantic, where the cables of British and other companies are exposed to greater risk than on the European side. The injury there, it is true, is not caused by trawling gear; but is caused by fishing vessels, which make it a practice to anchor on the grounds traversed by the cables. It need scarcely be said that injury by anchors is not less objectionable than injury by trawling gear. The Anglo-American Telegraph Company testified that for eight interruptions attributed to trawlers on the European side of the Atlantic, there were forty-three on the other side attributable to fishing schooners; and both the Anglo and the Commercial companies keep repairing steamers on the American side of the Atlantic because there is more for them to do on that side than on the European.

Compliance with the request of the Atlantic cable companies, therefore, while it would have the effect of closing a wide area to fishing operations would afford inadequate protection for cables, and could only lead to demands for the closing of other, and, perhaps, wider areas.

The Atlantic cable companies admit that prescription by His Majesty's government alone could not be recommended, seeing that, while it would shut the door to British fishermen, it would leave it open to the fishermen of other countries. If there is to be prescription, they realize that it must be international, and must apply to vessels of all countries. It would be easy to refer to precedents for the imposition of restrictions on fishing operations. But such restrictions, whether acquiesced in by the fishermen or not, have almost invariably had for their object the preservation of fish and the protection of the fishing industry itself. Even in the case of the International Convention for the Protection of Submarine Cables, some of the regulations were expressly designed to safeguard the fishing industry; and it is impossible to forget the difficulty which was experienced in inducing the various countries concerned to agree to the moderate protection which the convention provides for cables.

But, apart from any question of precedent and whether difficulty with other countries might be encountered or not, the committee were unable to recommend the proscription of the area described by the Atlantic cable companies. They considered that it would be an unjustifiable interference with a business which represents a capital of several millions, gives employment to a body of hardy and industrious men, and supplies a substantial part of the food of the people; while its enforcement would involve police measures of a difficult and costly nature.

The committee have considered suggestions that the position of cables should be shown exactly on Admiralty and other charts, with a view to the avoidance of trawling in their immediate neighborhood. But, apart from any other objections to this course, the committee think that it might not be of much utility in practice, as the fishermen cannot, as a rule, fix their position so accurately out of sight of land as to enable them to confine their fishing to the grounds between the cables. Thus the avoidance of trawling in the vicinity of cables might resolve itself into its practical prohibition in wide areas, and this, as already stated, the committee are not prepared to recommend.

The committee mentioned an alternative proposal of the Anglo-American Telegraph Company, and call attention to certain proposals of the Eastern Telegraph Company and the Great Northern Telegraph Company. These are all practically of the same kind; and the committee think that in their direction lies the true solution of the difficulties which have arisen. The fishermen, left free to fish on grounds traversed by the telegraph cables, should be called upon to do what lies in their power to make their gear as inoffensive as possible; and they should further assist the cable companies by carefully trying to clear their trawls when they foul a cable, and should report every occasion on which they have lifted, or think they have come in contact with a cable. This view is generally accepted by the representatives of the trawlers. What is required, above all things, is a friendly understanding between the two interests; and the committee are convinced that a great deal can be done by co-operation and efforts at mutual accommodation.

While, however, attaching importance to friendly communication and co-operation between the cable companies and the representatives of the trawling industry, they do not think this is sufficient. However well disposed the owners of trawling vessels generally may be, there will probably always be some who may not be ready to adopt methods which are recognized as necessary in the interests of the cable companies. Moreover, there may be excusable differences of opinion as to what is necessary. The committee are therefore of opinion that the government, by a system of inspection, should take steps to level up the practice generally to that which may be

regarded as the best. They think that this is necessary and indeed urgent, and that any expense which might be incurred would be justified by the importance of the public interests at stake. The aim of the inspection should not—at present at any rate—be the adoption of any particular type of otter board, but the elimination, in all types, of obvious defects. The evidence given by Mr. Alexander Siemens shows the necessity for these precautions. The adoption of one appliance or another may depend to some extent on the ground over which it is expected that the trawling operations will take place, although it probably depends more on the whim of the trawling skipper. In the present state of knowledge on the subject it would not, in the opinion of the committee, be desirable for the government to interfere in this matter. But all attachments should be as simple and smooth as possible, and in every part of the otter board the aim ought to be to afford no resting place for a cable if it should chance to be caught.

Among suggestions for modifications of the gear is one by the Eastern and Anglo-American companies for a tripping rope. The committee do not see their way to recommend this suggestion, but they mention it as indicating a direction in which improvements might possibly be sought.

At all the ports visited by the committee, as well as at the inquiry held in London, the representatives of the trawling industry acquiesced in the suggestion that there should be government inspection. At the same time, they urged that it should be carried out by independent officers well acquainted with the requirements of fishermen, and that as a matter of fairness it should extend to foreign vessels. There can be little doubt that an agreement with other countries is necessary, and the committee think that eventually there may have to be a formal international convention if the inspection is to be permanently effective. Without such a convention an act might, it is true, be passed to make it illegal for foreign trawlers carrying injurious trawling gear to land fish in British ports. But legislation of this kind would be difficult to carry out, and would give rise to much irritation and dispute. It would be an extraordinary thing for England, moreover, to pass a law which, while directed against the foreigner, was not in defence of purely British interests, but in defence of an interest which to a large extent is not British. It is obvious that the question is international.

If compulsion of any kind were found necessary, a conference of the countries concerned would doubtless have to be held to settle the terms of a convention. The subject is too much beset with difficulties to permit of an understanding being arrived at in any other way.

It will be for the cable companies on their side to consider how far they should substitute a somewhat heavier type for the existing cable in certain areas. The Anglo-American Company has al-

readily adopted this precaution. The Great Northern Company and the Deutsch-Atlantische Telegraphengesellschaft have also in certain cases substituted heavier types of cable for previous types which they found liable to damage, with the result that such liability is found to have diminished.

The report concludes with the following summary:

1.—The committee are of opinion that injury is sometimes caused to submarine cables by otter boards of certain types and boards out of repair, and by beam trawls with defective trawl-heads

2.—They think that there would be little risk of injury from trawls of either kind if they were always suitably constructed and in good condition.

3.—They find that the owners of trawling vessels are generally willing, and indeed anxious, to modify their trawling gear with the view of minimizing the risk.

4.—They are not prepared to recommend the proscription of an area beyond territorial limits.

5.—They recommend that all cable companies should (as certain companies and the Post Office have already done) establish friendly relations with the fishermen who frequent the waters in which their cables are laid; while the fishermen on their part should try to clear their trawls when they foul a cable, and should report the position of any contact with a cable.

6.—They recommend that a system of government inspection of the gear of trawlers be at once instituted.

7.—They recommend that steps be taken through the diplomatic channel to invite neighboring foreign states to adopt a similar system of inspection.

8.—They think that eventually an international conference should be necessary to settle the terms of a convention on the subject.

9.—They recommend that the cable companies should consider the question of substituting heavier types of cable in the areas affected.

Radio-Telegraphy.

A patent, No. 901,649, for space telegraphy, has been granted to Oscar C. Roos, of Newton, Mass. A duplex space telegraph system in which the transmitting and receiving apparatus are permanently connected with the antenna or elevated conductor and are constructed and arranged to be operated simultaneously without mutual interference.

Prof. J. A. Fleming, in a recent lecture in London, discussing the scientific principles of radio-telegraphy and radio-telephony, mentioned some wireless problems awaiting solution. These were, he said: An effective means of "transforming-up" the frequency; the concentration of radiations in a given direction; automatic receiving and transmitting apparatus operating at high speeds, and a means of simultaneously using the same antenna for sending and receiving messages.

The United Wireless Telegraph Company hav-

ing acquired by purchase a factory property at Seattle, Wash., it will be taken over by the operating department of the company, headed by C. C. Galbraith, and work will begin at once in the manufacture of wireless apparatus for use on the Pacific Coast. The first wireless instruments to be turned out will be for a demonstrating wireless station at the Spokane, Wash., fair.

In England on October 15 a rearrangement in regard to radio-telegrams at coast stations to and from ships, went into effect. In most cases the Marconi company's sailing lists remain the standard source of information with regard to communication with ships through coast stations in the United Kingdom. In future the charge for telegrams intended for transmission to the ships in those lists will be at the inclusive rate of ten and one-half pence a word, without any minimum. If the ship to which the message is addressed is known to have passed out of range, and no attempt is made by the coast station to transmit the message, the charge (less the ordinary inland rate) will in future be refunded on application. In the United States the practice is where the ship desired to be communicated with cannot be reached that the entire amount of toll, including the inland charge, is refunded to the addressor. This plan, however, is unjust to the land companies, which while performing their portion of the service satisfactorily, subjects them to frequent annoyance, involving loss in money and labor and time. The practice enables unscrupulous persons to take undue advantages of the situation—chances, so to speak, of reaching friends, knowing that in the event of failure they would not be out of pocket by the transaction, the burden of responsibility being placed upon the telegraph company. The English Government takes a proper view of the matter, compelling the sender to pay the land line charges. The commercial companies in the United States in justice to themselves should adopt the English plan.

New Postal Office at Cedar Rapids, Ia.

The new office of the Postal Telegraph-Cable Company at Cedar Rapids, Ia., is a model in its way, and fully meets all demands on the company incident to a city of 33,000 inhabitants. It is located in the building of the Montrose Hotel, one of the finest hostelries in the West, at 219 Third avenue, a fine business thoroughfare. The position is a central one, closely adjacent to the post office, two blocks from the Union railway station, and about the same distance from the wholesale business district. The appointments of the office are first-class in every respect, the term modernity applying to all fixtures and apparatus installed. The staff employed at the present time includes J. R. Rose, manager; M. J. Supple and C. A. Bruch, operators, together with four messengers.

Telegraph Age is headquarters for electrical and telegraph books. Write for catalogue.

Death of John Mitchell.

John Mitchell, one of the best-known telegraphers in this country, and for many years night manager of the telegraph department of the New York Herald, died at his home in Brooklyn on November 3. His death was due to Bright's disease and other complications which confined him to his bed for three weeks prior to his passing away. His health, however, had not been good for some time past.

Mr. Mitchell was born in St. John's, Newfoundland, September 21, 1853, and was educated at St. John's College, St. Bonaventure, and at St. Dunstan's, Charlottetown, Prince Edward Island. He entered the employ of the Anglo-American Telegraph Company when a boy and was in charge of one of its cable stations while still in his teens. He came to New York in 1878 and soon won a reputation as an expert telegraph operator. Natural executive ability placed him in the front rank of the telegraphers' organization here and he was its chief, with the title of master workman, when the strike of 1883 began.

Mr. Mitchell was associated with the publisher of Telegraph Age in the establishment of this paper in 1883, but his continuance in journalism was of comparatively brief duration. He was at heart a telegrapher, and he soon returned to that occupation, finding employment with The United Press at Auburn and at Newburgh, N. Y. Mr. Mitchell was a man of generous sympathies, seldom refusing a call made upon him for assistance, and many stories are told of the helping hand he so freely extended. His connection with the Herald dated from 1893. During the fifteen years in which he was thus engaged the really fine executive qualities of the man were brought to their full fruition in his management of the telegraph department of that journal. He was intensely loyal to the business that dominated his very existence.

When the Spanish-American war came Mr. Mitchell was one of the first men to be sent by his newspaper to the zone of hostilities, and in the earlier days of the conflict in the West Indies he rendered important services to the Herald in getting through to New York the news of the various happenings of world interest in that part of the globe, for it must be remembered that the limited cable facilities groaned under the weight of the enormous trade unexpectedly thrust upon them, the business being from two to three days behind. It was immediately after the battle of Santiago and again after the destruction of Cervera's fleet by Sampson and Schley, however, that he performed his greatest achievements. During those days Mr. Mitchell was stationed at Kingston, Jamaica, between which port and the actual scene of conflict at Santiago the Herald's tugboats carried frequent dispatches, as events at the front warranted.

On the night after the land battle before Santiago and again on the night following the destruction of the Spanish fleet as it sought to

escape from Santiago harbor, Mr. Mitchell obtained possession of the two cables out of Kingston, one by way of Panama, Colon and Galveston, and the other via Bermuda and Halifax, and sent thousands of words descriptive of the day's historic events over them.

As a result the Herald on the following morning was able to print the only complete stories of the great American victories on land and sea that were printed in any newspaper in the world. The cost of the messages in each case was not far from \$9,000, or the maximum rate of about \$1.50 a word. Mr. Mitchell, in a private message to the Herald, informed the management of that paper that Cervera's fleet had been destroyed and that he would "burn" the paper's money that night if necessary in order to get the details of the news through. The zeal and enterprise displayed by Mr. Mitchell on this occasion in serving Herald interests was much appreciated by his employers, who, indeed, throughout his long term of service, held the intrepid operator in high esteem.

Mr. Mitchell was the embodiment of the successful all-around newspaper telegrapher, for he was not only an expert cable and land line operator, inclusive of the wireless system, but was also an able journalist.

When wireless telegraphy was still new Mr. Mitchell successfully superintended the work of demonstrating its commercial possibilities which the Herald conducted in its ship news service from Nantucket. In the summers of 1907 and 1908 he was in charge of the wireless news service on the Herald's despatch boats which accompanied the New York Yacht Club on its annual cruises, handling stock market reports and other important news for the benefit of the yacht fleet and sending to New York the results of the daily sailing contests and other news of the yachtsmen.

During the telegraphers' strike of 1907 Mr. Mitchell, who had great influence in the councils of their organization, declined office repeatedly. He made an address to the assembled operators in New York, which did much to win sympathy for the conservative element and defer a general strike. He also organized relief projects for the families of indigent strikers.

Mr. Mitchell was married in 1884, to Miss Minnie E. Swan, of New York, a prominent telegraph operator of those days, who survives him, together with a son, who is married, and by three daughters. The interment was at Washingtonville, N. Y.

Obituary Notes.

Charles L. Whelpley, a member of the United States Military Telegraph Corps, died in Washington, D. C., November 3, aged sixty-five years. Mr. Whelpley was one of the beneficiaries of the military telegraph pension fund adopted recently by Mr. Carnegie.

Professor William Edward Ayrton, F.R.S., one of the foremost electrical engineers of England, died in London, November 8. He was born September 14, 1847. He studied electrical engineering with Lord Kelvin and became prominent in the telegraph service of India, reaching the post of electrical superintendent. He held professorships in various institutions, including that of natural philosophy and telegraphy at the Imperial College of Engineering, Japan. He was president of the Physical Society, England, 1891-92, and president of the Institution of Electrical Engineers in 1892. In 1904 he was dean of the Central Technical College, and in 1905 he was lecturer for the British Association at Johannesburg, South Africa. He was a voluminous writer on scientific subjects and an inventor of note.

R. R. Haines, formerly and for many years manager of the Postal Telegraph-Cable Company at Los Angeles, Cal., died at that point November 6, at the age of eighty-two years. He was born in Maine and entered the telegraph service in 1848. In 1857 he went to California, and after working as a telegrapher for some time, was promoted to be assistant superintendent to the late James Gamble. Mr. Haines was one of those who took part in the Russo-American overland telegraph scheme projected in 1865 by the Western Union Telegraph Company. His experiences, written by himself, incident to his connection with this expedition, were printed in detail in *Telegraph Age* April 1, 1903. For several years past Mr. Haines has been practically retired from active service in the telegraph.

Following a stroke of paralysis suffered by Mrs. Dunning, wife of J. E. Dunning, the well-known old-time telegrapher, of Paterson, N. J., on September 13, her condition steadily became worse, until on Tuesday, November 10, when she passed away. The funeral occurred on Friday, the thirteenth instant. Mrs. Dunning was a most estimable woman, possessed a fine personality and had a large circle of friends by whom she was greatly beloved. Both Mr. and Mrs. Dunning were wont to be regular in their attendance at the reunions of the Old-Time Telegraphers' and Historical Association, among whose membership none were held in higher esteem.

Another Instance of Good Telegraph Service.

So much criticism is made in these days respecting the slowness of the telegraph that it is refreshing to hear something public stated commendatory of the service. According to an Oklahoma paper it appears that a firm of cotton dealers in that western town sent a message by the Postal Telegraph-Cable Company of Texas, to a cotton exchange house in New York, the same being filed at 1:50 in the afternoon. In exactly four minutes, namely, at 1:54, a reply was received. A second message was dispatched at 1:58, to which an answer came

in three minutes, at 2:01. In both instances the answering messages were filed for transmission following a delay occasioned by the execution of an order on the floor of the Cotton Exchange, the objective point of the telegraph circuit. Both messages were sent via Dallas, Tex., the only point of relay on the route. The ordinary time of transmission of telegrams of this character, between the points named, is from six to ten minutes, although a five-minute exchange of messages is frequent. In the incident referred to only normal wire facilities were maintained, "rush it along" being enjoined simply. Such speedy work, however, reflects credit upon the telegraph system.

Mr. English Confers with His Managers.

The regular annual meeting of the managers of the Postal Telegraph-Cable Company of Texas, was held at the executive headquarters of the company at Dallas, Tex., on Saturday, October 17. This assembling of managers is had for purposes of conference with General Manager S. M. English, called with a view of promoting better service, to secure a better understanding of things necessary which will conserve the interests of customers, and things which will tend to a closer affiliation with all officers, from highest to lowest. The managers, who were received as guests of the company, met in the auditorium of the Commercial Club, with Mr. English. The session was executive in character, during which "Betterment of the Service" was the main topic of discussion. In the evening the visiting telegraph men were entertained at dinner by Mr. English at the Southland Hotel, after which all attended the theatre. The stay at Dallas was prolonged over Sunday and Monday, time being employed in automobiling and sight-seeing, visiting the Texas State Fair, also as guests of the telegraph company, the instructions being to forget business and have a good time.

Those present at the conference were: F. C. Cole, Galveston; J. D. McClelland, Houston; W. E. Herring, San Antonio; A. G. Steele, Waco; W. Y. Nolley, Fort Worth; H. E. Sims, Paris; P. R. Napier, Sherman; J. Coffey, Oklahoma City; O. M. Lowe, Little Rock; J. W. Gilliam, Fort Smith; J. I. Hendricks, Shreveport, coming from abroad, the Dallas office being represented by S. M. English, general manager; W. A. Logan, special agent; J. Q. Pipkin, chief clerk auditor's office; W. L. Jones, manager, and S. S. Scothorn, chief operator.

The affair was as successful as it was delightful, and in its conception and consummation reflected the good will of General Manager English toward his subordinates, a friendly feeling that has dominated his administration and done much to advance its success.

Orders for books on telegraphy, wireless telegraphy, telephony, all electrical subjects, and for cable codes, will be filled by *Telegraph Age* on the day of receipt.

LETTERS FROM OUR AGENTS.**PHILADELPHIA, POSTAL.**

The office in the produce and fish district, which was located at No. 9 Spruce street, has been moved to 105 Dock street. The new office is located in the heart of the district. Credit is due Charles E. Stump, who has been manager of the telegraph office in this district for thirty-five years, for securing such a desirable location.

The new office is up to date in all respects, having the latest style Skirrow patent switchboard and is lighted by the new tungsten lights. Six duplex sets and one single wire have been installed. There is also an anti-room off the office, which furnishes a suitable cloak and supply room.

Mr. Robert Mecredy, manager of the office in the Commercial Exchange, who has been confined to his bed with rheumatic gout for ten days, has returned to duty.

NEWPORT, R. I., WESTERN UNION.

This company has taken a lease of the Ferretti Building, at the corner of Thames street and Sayers wharf, for a term of ten years, possession dating from November 15. The new office is being equipped in an up-to-date manner with modern improvements, including a room for newspaper correspondents. This company has occupied its present quarters since 1873. Its first office in Newport was on Green street. Here James D. Proud was manager, and William Crapo and James Ingraham were operators. Headquarters were later established in the Kinsley express office, on Thames street. It was this express company that built the first telegraph line from Newport to Fall River, at which time and for many years thereafter it was an "other line" office, the rate from New York being 40 and 15. When the office was moved into the Cottrell Building, which it has occupied for more than thirty years, George W. Flagg succeeded James D. Proud, who was the first manager. Mr. Flagg was succeeded by W. A. Harris, of New Haven, to be followed by Thomas J. Smith, of Rochester, N. Y., and subsequently upon his death, by George L. Ferrin as acting manager for about a year, then by Allan Woodle as manager for a short time and last by Harvey J. Lockrow, the present incumbent. The operators, as far back as 1871, were James C. Robinson, of Biddeford, Me., and George L. Ferrin, of Concord, N. H., the latter having remained in the service consecutively and almost in the same chair for thirty-one years. In those early days it may be observed personnel counted for something. Charles T. Bliss, who was the bookkeeper at that time, is still with the company in Newport, and is the only one left of the famous well-known four, Messrs. Robinson, Flagg, Ferrin and Bliss.

NEW YORK, POSTAL.

This office handled an enormous amount of press matter and other telegrams on the night of the

election. So perfect were the arrangements under the management of F. F. Norton and his able staff, that not a hitch or delay of any kind occurred. It must have been gratifying to the executive department to have observed the loyal and willing spirit displayed by the operating force who worked under such tremendous pressure.

A. J. Collier, a former manager at Yonkers, N. Y., has been assigned to this office.

W. R. Cox has resigned to go South.

Another resignation is that of Miss H. V. Cunningham, long in this department, who is soon to be married.

The Associated Press and Hearst News have been using the "Royal Standard" with splendid results for some time past. The Royal, a hundred-dollar value at sixty-five dollars—just what the telegrapher has wanted for thirty years. Rents at three dollars monthly. Write me for free trial. D. A. Mahoney, Royal Typewriter Company, New York.

OTHER NEW YORK NEWS.

Assessment No. 484 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of James W. Hill, at New Orleans, La.; David L. Sullivan, at Wellsville, N. Y.; George B. Gaines, at Fairmount, Va., and Martin L. Hellings, at Devon, Pa.

Attention is again directed to the regular meeting of the Telegraphers' Mutual Benefit Association of New York, which will be held at four o'clock on the afternoon of Wednesday, the 18th inst., at 195 Broadway.

New York Telegraphers' Aid Society Entertainment.

The reception and entertainment of the New York Telegraphers' Aid Society, held Tuesday evening, November 10, at the Lexington Avenue Opera House and Terrace Garden, was both a highly enjoyable and a very successful affair. The occasion marked the twenty-seventh annual meeting and attracted a large number of the telegraph fraternity, men and women, and their friends. There was good music, and a high-class vaudeville entertainment was presented. The concluding hours of the evening were given over to dancing, and this was kept up until late. As the proceeds of these yearly events are devoted as a contribution to the relief fund, maintained as an auxiliary of the society, to aid sick and needy telegraphers, it is gratifying to note that the large attendance may be accepted as an assurance that this humanitarian purpose will be successfully carried forward this winter. The thought and determination that underlies these events, providing for the amelioration of the sufferings of others, is worthy of all praise, and too much commendation cannot be bestowed upon those who work diligently to make this accomplishment

possible. The affair just concluded will rank among the best of the kind heretofore held in the long series.

Chinese Government Takes the Telegraph.

Advices from Shanghai, China, state the unwisdom of the Chinese government in taking over at the present time the system of telegraphs which now covers the provinces is a leading topic of discussion and criticism in Chinese society. Most persons agree that the forced transfer of the telegraphs to the Chinese government is a high-handed act, and there is a strong tendency to attribute the desire to possess them to the fact that they have proved remunerative. It is freely stated that the government cannot leave possible sources of revenue unexploited.

At the request of the telegraph adviser of the Board of Posts and Communications, Cheng Pi, the president of the board, will establish a factory in Tientsin for the manufacture of all the material which is likely to be required for extensions of the telegraph system which are projected, and which the impending nationalization scheme will involve. It is expected that the new lines and extensions which are contemplated will involve 10,000 miles.

A United States consular report states that 22,419 miles of telegraph lines were operated by the Imperial Chinese Telegraph Company in 1906. The system has 34,473 miles of wire, a submarine cable of 946 miles and 379 offices, of which sixty-two were open day and night, and three hundred and seventeen for day service only. The number of instruments was 768. At the head office in Shanghai the staff numbered sixty-seven, and the general staff 3,175, while inspectors, linemen, etc., brought the total up to 3,400.

The Chinese language being syllabic, and not alphabetic, many may wonder how a message is transmitted. The method is simple but ingenious. There are as many characters as words in the Chinese language, and the messages are sent in number cipher. When the numbers are received at the other end a double-ended type is used, with numbers at one end and characters at the reverse. A message is set up by the numbers and then printed from the reverse end, which shows the characters.

M. J. Reidy and D. J. O'Brien, two Boston telegraphers, were elected members of the Massachusetts State Legislature at the recent election.

Fire in the central telegraph office at Brussels, Belgium, on October 22, stopped all telegraphic communication between Brussels and the provinces and foreign cities. It required ten days to restore the telegraph system. The spread of the fire was so rapid that the employes became panic-stricken, but no one was injured.

It is contemplated to set up a telegraph line to

the top of Monte Rosa, Italy, a height of 4,538 meters above sea level. It will be afterwards extended to the observatory on the Col d'Ollen, then to the Margherita-Hütte, near the summit. The erection of the poles in the snow and ice region will be attended with great difficulty.

The stealing of copper telegraph wire is apparently as frequent an occurrence in England as in this country. Since August last 4,000 yards have been stolen from the Midland Railway and 700 yards of the London and North-Western wire. Six detectives were assigned to the case, and two men were caught red-handed.

The Serial Building Loan and Savings Institution, 195 Broadway, New York, offers a satisfactory and attractive depository for the savings of telegraphers. This old and absolutely safe concern, organized under state banking laws, is in a position to render certain benefits to its depositors, regarding which those whom you know who have been its almoners, will abundantly testify. A call or correspondence is invited.

Advertising will be accepted to appear in this column at the rate of twenty-five cents a line, estimating eight words to the line.

Reward: A reward is offered to any person furnishing information as to the whereabouts of Operator E. J. Hamilton. Address "Z," care Telegraph Age.

Will buy or sell, in one to ten-share lots, Western Union Telegraph Company and Mackay Companies, stocks. Remittances by New York draft or express money order are requested. Address "Stock Investment," care Telegraph Age, 253 Broadway, New York.

No up-to-date telegrapher can afford to be without TELEGRAPH AGE. It furnishes him with information essential to his welfare. Send for a sample copy.

Rubber Telegraph Key Knobs.

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

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

Log Pattern \$3.50
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THE LEFLEY KEY.



The Best Key on the Market for Business and Profit. Because it does not stick; is durable; speedy; insures fine clear-cut Morse; an easy sender.

Send draft, express or P. O. money order.

S. B. LEFLEY,

Columbia, Pa. R. F. D. No. 1

The Postal Telegraph-Cable Company of Texas.

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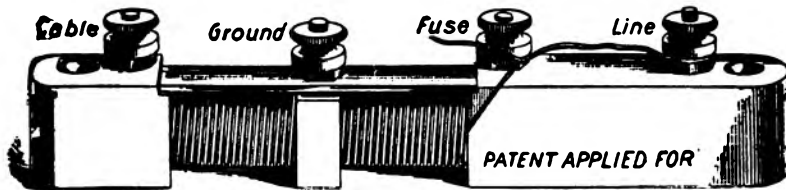
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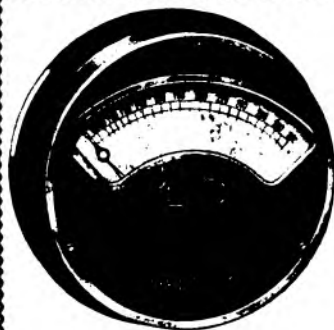
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