TELEGRAPH AGE

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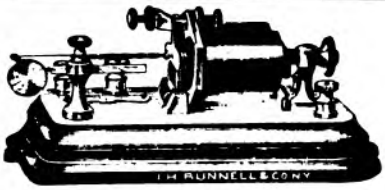

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TELEGRAPH AGE

No. 19. NEW YORK, OCTOBER 1, 1909. Twenty-sixth Year.

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Prodding Voice of Experience. Wrinkles—New and Old.

If Professor Morse through some miraculous means should be permitted to again visit this world and personally inspect the paraphernalia of a modern telegraph office to-day, it is almost absolutely certain that he would not only pronounce the plant perfect, but probably believe that improvements were utterly impossible; yet we who have listened to the voice of long experience and thereby gained wisdom know that not a day passes during which this ever-present monitor is not heard not only depreciating, but actually finding fault with our very latest and proudest achievements. Were it not for this prodding voice the world's progress would cease.

When that historical first message, "What hath God wrought," was transmitted over the circuit between Washington and Baltimore in 1844, the fulfilment of Morse's greatest expectations was accomplished. He had established a practical means of instantaneous communication between widely separated localities on the surface of this globe. What more could be expected or even desired?

Had the little voice remained silent during the resulting popular enthusiasm and period of supreme contentment with the achievement which followed for a while, we would still be receiving messages on a running tape by means of the old register, and would also require a metallic circuit, or two wires, instead of one.

Fortunately, for posterity, one day one of the wires broke and the two ends fell to the ground, where they luckily found good "earth" connection, or as we say to-day, both ends "grounded." This fact was not discovered for several days, but when the situation was finally disclosed and the officials learned that they had been working the circuit right along although one side of the loop was out of commission, they heard the faint voice of a newly born experience protesting that two wires were used when the earth itself would perform the same service as a return wire. That one little "kick" alone doubled the mileage of the telegraph plant without incurring the expenditure of an additional dollar.

From that day down to the present time that voice, like the proverbial small boy, has been irrepressible. Apparently still dissatisfied with the total output of the great invention it was soon heard finding fault with the size or gauge of the conductors used; why not employ wires of greater diameter and thus gain distance without additional battery power?

Later on it condemned the use of iron wires as a standard metal and hinted that copper, owing to the fact that it will not rust, is not only cheaper in the long run, but possesses many desirable qualities which iron does not. Finally after we have practically covered the globe with a net work of copper wires in gauges and degrees of purity in accordance with further dictations, this same exasperating voice has gone much further and is fast driving some people to the brink of desperation by suggesting that we actually dispense with wires altogether.

Nor was experience inactive in other directions. Beginning with small things a tired arm suggested the construction of a less cumbersome key. The discovery that a magnet wound with a very small thin wire was, with a given volume of current just as efficient as a big one wound with large thick wire and quicker in action as well, provided the number of turns was identical, resulted in the acquisition of more sightly and better receiving apparatus. The ear detecting the phonetic language for the register's lever as it hammered the dots and dashes on the running tape sounded the death knell of that method of receiving. The result was the register gave way to the pen and ink or "sound" operator and the direct copying method was thus inaugurated.

For many years the little voice was pretty well silenced. This last achievement seemed to leave nothing more to be desired. But one day an ambitious operator was detected copying messages on a typewriter direct from the wire and the ease with which he could keep up with a fast sender caused our little prodder to insist that this method become the rule instead of the exception. Many second and third class pen operators were thus able to become strictly first-class receivers through the facilities offered by the machine in the way of furnishing a means by which they could copy incoming matter more rapidly than they could with a pen.

Then it was noticed that the most rapid senders could not transmit messages and press matter fast enough to even hurry a good operator using a typewriter, so the little voice whispered in Walter P. Phillips's ear, "get up a code, and increase the capacity of the wire." Then, still dissatisfied, is kept suggesting and hinting that the typewriter machine might possibly be made to copy the messages without the aid of the operator at all until Mr. Barclay and a few other inventors finally perfected devices that will actually operate a "mill" automatically. Thus was born the page printing telegraph system, the method which in due time will dispense with the Morse operator entirely on all through circuits which handle a sufficient volume of business to warrant its installation.

Looking backward from this last great achievement the development of the telegraph system certainly does give us good cause for self praise, but let us not boast, fifty years hence the people who will then have charge of the telegraph systems will no doubt have advanced so far beyond our present knowledge that our modern telegraph offices would appear to them as being very crude affairs. But there is one thing we can prophecy with absolute certainty and that is that all who follow us, be it fifty or five hundred years hence, will in turn still hear that same nagging voice continually belittling their work and thus forcing them through actual self defense on toward greater deeds.

[In the last paragraph of the article in our September 16 issue, "Some Points on Electricity," the writer unintentionally stated that that leg of a magnet where the lines of force enter is called the north pole and where they come out is called the south pole. The fact is the opposite of this statement. They enter the south pole and come out at the north pole.]

Recent Telegraph and Telephone Patents.

Patents Nos. 933,149, for a telephone trunking system and 933,150, for a telephone system, have been secured by Charles S. Winston, of Chicago.

A patent, No. 933,335, for a telephone supervisory system, has been awarded to William S. Paca, of Oil City, Pa.

Patent No. 933,404, for telephone apparatus, has been granted to Kelley M. Turner, of New York, and Howell W. Haff, of Babylon, N. Y.

Patent No. 933,726, for a telegraph key, has been taken out by F. W. Smith and DeWitt C. Conkling, of New York, N. Y. Makes use of separate keys for sending dots and dashes and varies the periodicity of the interruptions of the circuit.

Patent No. 933,824, for a telephone stand, has been secured by C. S. Coom, of Rockledge, Pa.

The following patents have expired:

Patent No. 482,015, for a printing or recording telegraph, held by Zachary T. Lillard and Ursinus Erhard, of Kansas City, Mo.

Patent No. 482,129, for a combined telegraph key and sounder, held by D. J. Ludwig, New York, N. Y.

Patent No. 482,440, for a telegraph relay, held by William Maver, Jr., of New York.

Personal.

Mr. Melville E. Stone, general manager of the Associated Press, expects to start soon on a trip around the world. A farewell dinner will be tendered him October 4 by the Lotus Club.

A daughter was born September 11 to Mr. W. S. Eckert, of New York, a nephew of General Thomas T. Eckert, and well known to the electrical profession.

Dr. Sannosuke Inada, electrical engineer of the Japanese Government Posts and Telegraphs, Tokyo, will spend several weeks in New York making an extensive study of the telegraph systems of this country.

Miss Mary J. Macaulay, United Press operator at Lockport, N. Y., and one of the most efficient lady telegraphers in the country was a recent New York visitor, calling on many old friends while in the city.

Mr. E. Parsons, formerly assistant superintendent of telegraph of the Illinois Central Railroad, and later with the Sandwich Electric Company, Sandwich, Ill., is now connected with the National Dictograph Company, of New York.

Mr. Charles A. Tinker, who, since his retirement from the position of general superintendent of the Eastern division of the Western Union Telegraph Company, has resided at 155 Lefferts Place, Brooklyn, N. Y., recently abandoned housekeeping and is now living at the Hotel Mohawk, Brooklyn.

Mr. T. Comerford Martin has resigned his position as editor of the Electrical World, New York, to become secretary of the National Electric Light Association, of which he was one of the founders. The withdrawal of Mr. Martin from the general electrical field is to be regretted. He was a man of great energy and fine capabilities, and being well known in all branches of the electrical art, his associating himself with one branch exclusively is regarded as a great loss to all others.

Canadian Pacific Railway Telegraph.

Mr. James Kent, manager, and W. J. Camp, electrical engineer, Montreal, have returned from a trip of inspection which took them over the entire system west of Montreal.

Mr. E. F. Jennings, of the Montreal office of this company, was married recently at San Francisco to Miss E. Obenaur. While en route to Montreal the newly married couple visited the Alaska-Yukon-Pacific Exposition at Seattle.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. I. McMichael, vice-president and general manager of the Great North Western Telegraph Company, Toronto, and Mr. H. A. Tuttle, vice-president and general manager of the North American Telegraph Company, Minneapolis, both being in New York at the same time, Mr. E. J. Nally, vice-president and general manager of this company, gave them a dinner in remembrance of the time when all three were co-laborers in telegraph circles at Minneapolis in the early eighties.

Mr. C. C. Adams, second vice-president of the company, has returned to his office after a vacation.

Mr. S. B. Haig, superintendent of traffic, is absent from his office on vacation.

Mr. J. H. Wentworth, cashier of the company's Boston offices, has the sympathy of his associates in the death of his wife.

Among the recent executive office visitors were: Mr. H. A. Tuttle, vice-president and general manager of the North American Telegraph Company, Minneapolis; Managers C. H. Goddu, of Springfield, Mass.; F. B. Travis, of Washington, D. C., and F. N. Cooke, of Wooster, and A. M. Smith, chief operator at Pittsburg.

The company is distributing a new pocket-size edition of its 1909 book containing a list of the points reached by its own and associated lines in the United States and Canada. The list contains the names of 30,093 places for which business is handled by the company.

RESIGNATIONS AND APPOINTMENTS.

Mr. H. N. Roy has been appointed manager at Asbury Park, N. J., vice H. A. Guyon, resigned.

Mr. G. M. Purdy, manager at Mansfield, O., has been transferred to the managership at Dayton, O., to succeed Mr. F. T. Bott, who has resigned to engage in other business at Cincinnati.

Mr. W. W. Morrison, manager at Des Moines, Iowa, has resigned on account of ill health and is acting as manager of the office at Salt Lake City, vice Mr. Donald McNicol, who has been granted a leave of absence for three months. Mr. H. E. Patton, chief operator at Des Moines, has been appointed manager vice Mr. Morrison. Mr. J. B. Sample has been appointed chief operator, vice Mr. Patton, Mr. F. M. Lansing retaining the night chiefship.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Among the recent executive office visitors were Mr. Isaac McMichael, vice-president and general manager, and Mr. S. B. McMichael, general assistant of the Great North Western Telegraph Company, Toronto, Ont.; Mr. John McRobie, of Chicago, superintendent of the Western division of the American District Telegraph Company of New Jersey.

Mr. T. W. Goulding, European general manager of the company, with headquarters at London, arrived in New York on the steamer Celtic on September 18 and will remain in this country for two months. He will visit his old homes at Winnipeg and Seattle before returning to London.

Mr. James J. Morris, manager of the Chamber of Commerce office of the company at Milwaukee, is spending a few days in New York on his way home from a two months' trip to London, Paris and other European points.

Barclay printing telegraph equipments are being installed on the following circuits: Cincinnati and Pittsburg; Cincinnati and Detroit; Cleveland and Detroit; Cleveland and Buffalo; Cincinnati and Louisville, and Louisville and Nashville.

Isaac W. Hallam, of Wilmington, Del., has recently completed fifty-one years' service for the Western Union Telegraph Company at that point. During that time he has not missed a day at his desk with the exception of a vacation of one week that he took at the time of his marriage in 1864. During the war he was enrolled in the United States Military Telegraph Corps, Wilmington being an important office on the military lines during those stormy days.

Sale by Western Union of Telephone Stock.

The Western Union Telegraph Company has disposed of its holdings of stock in the New York Telephone Company, selling the same to the American Telephone and Telegraph Company. The amount of stock held by the Western Union was $16,221,800. In commenting upon the exchange, President and General Manager Robert C. Clowry said that the proceeds of the sale would enable the Western Union company to liquidate a considerable part of its existing bonded debt and would provide for a long term of years funds for improvement and construction purposes. He also stated that the transaction involved a cash consideration and had no part in the settlement of the twenty-five-year-old suit against the American Telephone and Telegraph Company, in which the Western Union, at the present status of the case, has a decision in its favor involving approximately $5,000,000.

The price has not been officially made public, but it is understood that the company received a substantial premium for its stock.

The Cable.

Mr. Clarence H. Mackay, president of the Commercial Cable Company, returned from Europe by the steamer Lusitania on September 24.

Mr. George Gray Ward, vice-president and general manager of the Commercial Cable Company, accompanied by Mrs. Ward and John Goldhammer, his secretary, arrived in New York September 19, after spending the summer in England.

The Commercial Cable Company expects to begin work in November upon the diversion of a second cable from its present route from Ireland to Nova Scotia to the new route via Newfoundland.

The congress of chambers of commerce of the British Empire which convened recently in Sydney, New South Wales, on September 17, passed a resolution requesting the postal departments of the various governments to frame a combined scheme for complete state-owned electric communication between the motherland and Canada, Australia, and New Zealand, together with a substantial reduction in rates, especially on press messages.

The Russian government having agreed to the introduction of a press rate over the Siberian telegraph lines, the Great Northern Telegraph Company will soon be able to accept press messages for China, Japan and the Philippines at the rates prevailing on the Eastern Telegraph system.

Cable communication is interrupted September 28 with:

Isle of Pines August 28, 1909
Messages mailed from Batabano.
Foochow September 21, 1909
Messages mailed from Amoy.
Macao September 24, 1909.
Mogador September 24, 1909
Messages mailed from Casablanca.

Major O'Meara on the English Telegraph and Telephone System.

Major Walter A. J. O'Meara, chief engineer of the British government telegraph system, and George F. Preston, general manager of the London district telephone system, arrived in Boston September 15 and began their inspection of American telegraph and telephone systems.

Major O'Meara had this to say in an interview after completing his first day's work of inspection of the Western Union and Postal Telegraph-Cable Company's main offices:

"I am interested in these things from the engineering point, because the engineers have to meet the requirements of the traffic of the people, and the latter ought to conform to the advice of the engineers who practically have to provide the telegraph and the telephone plant, of which the cost and operation is largely an engineering matter.

"At the Western Union office I looked over the Barclay system in use in sending messages between important points. By that system an operator merely writes on a machine similar to a typewriter, the keys operating punches which perforate a tape, and the message comes out at the receiving point in print, ready for delivery to the person addressed.

"It is a good system, but the conditions we must meet are very different from those existing here. The whole telegraph system of England is so interlinked that when one line is busy we merely use another to get our messages through, so that delays are not frequent. A delay of a half hour is unusual, and delays will not average more than ten minutes, I think. If they are longer than that we hear from the people at once about it.

"Relative to the Barclay system which I saw in operation, we have something similar in operation in England, known as the Murray system of machine telegraphy. It is very similar to the Barclay system, so far as the sending apparatus is concerned, but differs in the receiving end, where the work is split, the original message being received in perforations and then by machine translated into the printed message for delivery. By it we can send 120 words per minute over a 400-mile circuit, which I understand is a greater speed than the Barclay machine can attain.

"I gather from what I have heard here that the American people are of the opinion that English people use the telegraph almost altogether in preference to the telephone. That is not quite true. Of late years the telephone has been cutting into the telegraph interests in England in an ever-increasing rate. For short distances the telephone is cheaper by half and that is one of the main reasons for it.

"Take it in South Wales, where the post office, under which both services come, has been longest at work and there the telephone has so encroached upon the business of the telegraph that the latter has been discontinued altogether and all such work is done by telephone, the trunk lines being used for what little telegraph work there is, when that is necessary.

"Our telephone system is by no means as good as the American and is not so generally used, I am sure. But that in a measure is due to our divided jurisdiction. In 1896 the government bought out the long-distance telephone lines and restricted the telephone company to the short-distance work.

"In London, for instance, this divided authority delays improvements considerably and otherwise works to the detriment of the telephone service, and the London service is that by which practically all tourists judge our system. For instance, if we need a new trunk line, the government may be agreed that it is necessary, but it has to get the telephone company doing the short-distance work to agree to it, and as the telephone concern is what you might call an expiring corporation, it is naturally not quick to see the need for any large expenditures.

"In the greater London district of 600 or more square miles, we have practically a free service for annual subscribers to the telephone for stretches as long as twenty miles. That makes it a very difficult proposition to get at a scientific rate. We use

a measured service as being fairer, and subscribers buy a block of 500 calls, at, as I remember it, $25, and for calls above that number there is a lesser rate up to a certain point. When they get to a certain number per year we insist upon the installation of a second instrument, as we do not wish to overload the telephones.

"Roughly, we figure $15 as the standing engineering charge of a circuit one-half mile in length, and the cost of operation is a question of load and is variable, but if we sell a block of 500 calls we have fixed the rate to cover maintenance, etc., so that we know just where we stand. The added blocks of 100 calls are sold at the cost of operation and do not include maintenance, etc.

"It is true that neither our telegraph nor telephone systems are run at a profit under government control, but the actual deficit cannot be learned under our system of accounting, as the accounts are for parliamentary purposes and not for business ends. If a commercial account were taken of the year's business, I know the actual loss on a commercial basis would be far less than it appears to be."

Radio Telegraphy.

The Telefunken Wireless Telegraph Company has established a new station for the Brazilian government at Rio de Janeiro.

A wireless station at San Fernando, Trinidad, has been installed and communication established with British Guiana.

Many of the ships of the Japanese navy are equipped with a Japanese system of wireless telephony.

It is reported that the Dominion Government expects to expend $36,000 in improving the wireless telegraphic system along the Pacific Coast. Certain stations are to be enlarged and new ones built at points to link up a chain throughout the British Columbian waters.

A British Antarctic expedition, which expects to make an attempt to reach the South Pole, includes in its plans wireless equipment which will enable them to keep in touch with New Zealand from stations which they will establish at their bases of supplies.

The utility of wireless as a news collector was shown recently when Commander Peary on his return from the dash to the pole arrived at Battle Harbor, Labrador, where he found a wireless station of the Marconi company, and was able to spread the news of his discovery abroad several days sooner than he would have been able otherwise. The story of his expedition containing several thousand words was sent from the Battle Harbor station to Point Armour, thence to Whittle Rocks, Quebec, and thence to Cape Ray, Newfoundland, where it found the cable for further transmission to Europe and America.

Mr. W. Marconi, of London, was a New York visitor September 22, stopping here on his way to Glace Bay, where he is superintending the reconstruction of the wireless station that was destroyed by fire August 21. It is expected, he says, that the station will be in full working order again by January 1, 1910.

A patent, No. 933,263, for an oscillation device, has been secured by G. W. Pickard, of Amesbury, Mass. A rectifying oscillation detector mounted in a holder consisting of a metallic cup. The detector consists of iron pyrite and a leaf spring is arranged to present its broad side to the surface of pyrite.

A patent, No. 934,296, for a tuner for wireless telegraphy, has been issued to H. Dunwoody, of the United States Army. Combines a plurality of pairs of coils with an aerial, one pair sliding and the other angularly adjusted, relatively to the other, the number of turns remaining constant.

The British Government has completed arrangements with the Marconi Wireless Telegraph Company for the transfer to the government of the stations which the company now operates in Great Britain. The trans-Atlantic service via Poldhu and Clifden will still be kept up by the Marconi company. The post office administration will operate the wireless system as part of the general telegraphic system of the country for communicating with passing ships and with islands.

Should the Scope of Telegraph Age Be Enlarged?

Editor Telegraph Age:

As a subscriber to Telegraph Age for many years, I would like to suggest that its scope be enlarged to cover the telephone field more thoroughly. I would be glad to see the Age become as necessary to the telephone employes, especially that portion who are telegraphers, as it now is to those in the telegraph service.

While nearly all of the telephone companies are served by local publications which give a monthly resume of matters of interest in the territory of each company, there is no similar publication which chronicles current events which are of particular interest, either general, or personal, to the large number of "long distance" telephone employes in the various wire chiefs departments, and in the Morse operating department, the great majority of whom are telegraphers. A little effort on the part of Telegraph Age, would, I believe, enable it to greatly extend its influence and usefulness in this direction.

D. B. Grandy.

St. Louis, September 19, 1909.

Mr. C. H. Parsons, of Goodland, Kan., in renewing his subscription, writes: "I could not afford to let my subscription to your valuable paper lapse as it is just what a man needs that wants to be up to date in matters pertaining to the telegraph."

OLD AND RECENT TOURNAMENTS.

General Information as to Early and Late Speed Trials, with Incidental Comments on the Persons Concerned in Them, and Unnecessarily Complete Reports Perhaps, as to the Part I Myself Played in Them and in Other Related Events.

BY WALTER P. PHILLIPS.

The time is approaching, it seems to me, when we should have another telegraphic tournament. The Carnegie Diamond Medal, which was won by Frederic M. McClintic at the Atlanta, Ga., contest, in March, 1902, should be fought for under more exacting conditions than prevailed at Philadelphia in October, 1903, when William M. Gibson wrested it from Mr. McClintic under entirely different conditions than those that ruled at Atlanta.

Mr. Gibson has no greater admirer, as a sender, than I am; he was one of my most brilliant stars and was sent with my son in 1895, when my associate, Mr. Bassett, borrowed the latter from the Sun to do the regatta at Poughkeepsie, very much to his father's delight. Together, the younger Phillips, fresh from Columbia College, and Billy Gibson, set a pace for their competitors that is still remembered and I have never forgotten that much of the glory that fell to the Phillips family on that day was due to Gibson's work as an operator, his good sense and his clever suggestions. The next morning my son remarked: "Pop, I hear that Billy is one of the best you have, but he has no business to continue as a telegraph operator. He ought to get on the Sun as a reporter. He would be playing star parts as soon as he struck his gait."

It is evident from what I have said and of the long and intimate relations existing between Mr. Gibson and me — akin to those existing between father and son—that nothing I have said, or may say, reflects unfavorably upon him in any way. But the fact remains that there is a chance that he did not fairly win the Carnegie medal at Philadelphia. Gibson's sending was not up to the usual form, while McClintic's was superb. Two accidents occurred that disturbed McClintic and seriously affected his speed. A heavyweight, in moving past the table from which McClintic was sending, fell against it, like a ton of coal, nearly tearing it from its moorings. He not only did this once but a second time. Several who were present have mentioned this peculiar performance and assured me it was intentional. I know of no man who would be a party to such an obvious outrage, with a worse grace, than William M. Gibson, were he satisfied that the suspicions concerning his volunteer rooter were well founded. I am wholly without prejudice as far as Mr. McClintic is concerned. We never had the honor of having him in the service of the United Press. He was an Associated Press man at Memphis and Dallas and when he made his almost unprecedented record at Atlanta he came to Georgia from the Lone Star state. The only one who had closely approached McClintic's record at Atlanta was Albert S. Ayres, to whose remarkable achievement I shall recur, later on. I have every reason to think highly of Gibson's ability for the personal reason given in connection with the 1905 regatta at Poughkeepsie. To this good opinion is added the conviction as to his great worth based on his general work as a United Press operator whose achievements, redounding to our great credit and advantage, commanded my respect from the first.

Fortunately that while no official record was taken at Philadelphia, all of the senders were taken at Atlanta on an embosser of my designing and used as a part of the Phillips System of Telegraphy. The sending of Messrs. McClintic, White, Murray, Johnson and Hilliard was taken by Horace G. Martin, then an employe of the American Graphophone Company at Bridgeport, where he invented and made, out of a small graphophone, the first wig-wag sending device that was ever seen. He called it the Autoplex and has since changed it and renamed it the Vibroplex. All persons who claim priority of invention are wrong in that contention. The original machine, superimposed upon a low-priced graphophone and built at the factory of the American Graphophone Company, by Mr. Martin himself, is still preserved in the laboratory museum—proof positive that he is the originator of the idea, and no man has ever done work with it to my knowledge that was quite equal to Mr. Martin's own performances. He was one of the fastest senders in the service of the United Press (No. 1), and much of the beauty and tuneful characteristics of his key sending reappears in his wonderfully rapid work with the Vibroplex.

The embossed slips that Mr. Martin brought back from Atlanta were reproduced on another machine of mine, when he returned to Bridgeport and opened to my vision a new kind of sending, and I remarked that it reminded me of a dry observation by a New York operator, formerly a resident of Cape Cod, who was receiving from Fitemiller, then in Hartford. The dashes seemed so short to the receiving operator and the dots such will-of-the-wisp-like flutterings that he suggested dropping them both and merely sending the spaces. But this sally made no impression on the thoughtful Horace. He replied, quietly: "Well, I don't know, Mr. Phillips, that is pretty good tournament Morse. No one had to copy it, you know, and there was nothing to hold them down." This is what it was—"tournament Morse" —and McClintic's approached much nearer to superior sending than would be expected when the speed is taken into consideration.

When Ayres and I first entered the United Press service we had no leased wire to Boston and intermediate New England points. We sim-

ply had access to a wire leased by the American Rapid Telegraph Company to Kidder, Peabody and Company. When this wire was clear for a minute or two we, in the person of Frank Kihm, Wallie Grant, Ralph Blumenfeld or Steve Scandlon, made a grab for it and sent what we could before the Kidder, Peabody operators, who were good fellows, reluctantly took the line away from us. One day we had an important despatch and we asked E. F. Miller, who was the Boston operator and chief of the circuit, if we could have the right of way for ten consecutive minutes during the next half hour and he agreeably consented. John E. Wright, then my assistant, boiled the matter down into exactly five hundred words and when Ayres got circuit he sent it easily and beautifully inside of the ten minutes. It was before the typewriters were introduced and the operators not being supplied with the ink recorders that were used on the Associated Press wire between New York and Washington and at Philadelphia and Baltimore, where the code had been in use since 1879, nothing but full sending was to be thought of.

We had at one of the intermediate points a young lady equally famed for her ability as an operator and her surpassing loveliness as a woman. One day, when she had beamed on me until I was fascinated and bereft of words, I relieved the situation by asking: "Where were you the day that Mr. Ayres sent five hundred words to Boston in ten minutes?" and she replied, demurely, "I was right here. He is fine, but don't you think that Frankie Kihm is a lovely sender? Frank, now the iron-gray-haired telegraph editor of the Brooklyn Eagle, made a record on several occasions after that. He was a mere boy in those days—the youngest operator in the New York office of the United Press. Whether he could have sent the five hundred words as quickly as Mr. Ayres did is a question I am unable to decide, but it was apparent to me than an extremely bewildering creation of whom a returning sailor once said, on meeting her in their native town, "Shiver my timbers! but she looks like a full-blown rose," was in no doubt as to what sort of mince meat would have been made of Patsey's pretensions if Frankie should ever be placed in a similar situation. The mental attitude of this youthful telegraphic phenomenon reminded me of the charming damosel in Frederick Locker's delightful poem, "A Nice Correspondent." Among other things she wrote that:

To-day, in my ride, I've been crowning
The beacon; its magic still lures,
For up there you discoursed about Browning,
That stupid old Browning of yours.
His vogue and his verve are alarming,
I'm anxious to give him his due;
But, Fred, he's not nearly so charming
A poet as you.

Although there was a modest trial of sending ability in 1866, no really important events took place until 1868. The simultaneous arrival in New England of William E. Kettles, whose fame as an operator in the War Department at Washington had preceded him, and the advent of an unheralded operator from Fishkill-on-the-Hudson, soon led to great rivalry and Kettles, who was the day operator at Fall River, and Patrick Henry Burns, the newcomer from a railroad wire in New York state who had recently succeeded Patrick B. Delany as night operator at Worcester, were soon matched to see who was to be the champion of New England. Some one was kind enough to put up a gold key—a sort of pin to be worn on the lapel of the vest—and Kettles and Burns then proceeded to invite in all the men who had any skill as senders. Not many of them responded: William D. Gentry at New York; William R. Plum at New Haven, H. E. Shetler at Boston, and yours truly at Providence. We counted on getting clear some time during the night, but the press report was heavy and the

WILLIAM M. GIBSON.

ALBERT C. PHILLIPS.

FREDERICK M. McCLINTIC.

first opportunity we had to do our sending was at 2.30 a. m., after New York had sent "good night." All of us but Kettles were tired out. With the exception of Gentry, who had been sending to us from New York all night, every man's fingers had been clutching a pen, pencil or stylus for between eight and nine hours and sending fast and well was beyond us. All but the stars of the occasion, with the exception of the hustling Plum, took it easy and made no attempt to compete with the would-be champions. Burns sent fast but was pretty ordinary sending—a forerunner of "tournament Morse" of which Mr. Martin spoke with so much tolerance and kindness on his return from Atlanta. Kettles, who was then but eighteen years of age—frank, boyish and extremely healthy—had done nothing all night but sit around billiard halls, roll ten pins and come back to the office occasionally and a nap a little in Manager Potter's big chair. When he was oblige, President Lincoln seized the little chap and saying, "Here, you, Mars, catch him by the other leg," induced the grim and imperturbable Stanton to lend a hand, and thus assisted, Kettles was held up to public gaze. The crowd was appeased and departed with cheers for the boy operator who had been the medium of proclaiming to the country that war between brothers was over and that incidentally Grant had won the respect of the South in the flash of an eyelash by his quiet and manly way of accepting at Appomattox the surrender of his old West Point friend and comrade shortly before. I have told this story because it is one of the many versions that have been told in the newspapers for lo, these many years. The fact is, however, that on April 3, 1865, when Kettles received General Weitzel's despatch to Secretary Stanton, announcing that Richmond had fallen and that the city was on fire, Mr. Lincoln was at City Point,

WILLIAM E. KETTLES,
(1866)

PATRICK B. DELANY,
(1865)

W. R. PLUM,
(1863)

called he came to the scratch with a bound and proceeded to send his two hundred and fifty words in a way that astonished all the listeners stretched along the wire from Boston to New York and located in the terminal offices. Both Plum and Burns sent the two hundred and fifty words selected, in less time, but the key went to Kettles and everybody said it was all right excepting one of the judges—Henry Denver, of Springfield. He contended that I was the only one who had sent perfect Morse, but we bowled him over by agreeing with the other judges. Burns, Plum, Shetler, Gentry and I were in perfect accord and we all congratulated the young man who, while yet a boy of seventeen, had received in the War Department, the year before, the news of the fall of Richmond. The populace of Washington and the furloughed and sojourning soldiers were so excited that nothing but a sight of the operator who had received the news would send them home happy, and with his unfailing tendency to and did not arrive at the Capital until the evening of the ninth. The exhibition of Kettles at the window was made by Secretary Stanton without assistance, and was one of the few impulsive things that the solemn Secretary of War had ever been known to do, since, earlier in his life, he made a slight demonstration of pleasure when the jury, after listening to his eloquent speech, returned a verdict of not guilty, within an hour, and he and his distinguished client, Daniel E. Sickles, left the court room, arm in arm, the cheers of the multitude resounding in their ears and the judge's gavel impotent to quell the disturbance. Sickles had shot and killed Philip Barton Key, the disgraced and dishonored son of the author of the Star Spangled Banner, under circumstances that his countrymen unqualifiedly approved, when the case was laid before them in the masterful manner in which it was presented.

(To be continued.)

The Robert W. Martin Fund.

Mr. Walter P. Phillips is distributing among those interested a booklet containing the names of all those who have contributed to this worthy cause from time to time as they have been recorded in our columns, together with the complete statement of the case. To this matter he has added an interesting story written by Mr. Martin in 1889 for publication under the title of "A Man Who Used to Drink." Mr. Phillips will be glad to supply copies of this booklet to any one who is interested.

The committee in charge of the fund consists of J. B. Taltavall, of Telegraph Age; Charles W. Price, of the Electrical Review; T. Comerford Martin, and T. A. McCammon and Fred Catlin, of the Western Union Telegraph Company. All contributions should be addressed to J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

Mr. E. C. Boileau, of Philadelphia, in remitting $5.00 to be applied to the Martin fund, states that he regrets that he cannot make the sum $500.00. But he does the next best thing and forwards $5.00 contributed by a long-time admirer of Mr. Martin who does not wish his name made public, and though he had never met Mr. Martin personally, is very familiar with his name, having heard much about him. He adds that he hopes that Mr. Martin will receive a substantial token from his numerous friends and that Mrs. Martin will be similarly cheered up.

The old friends of Mr. Martin among the Philadelphia Western Union operators have, it is said, raised in small sums a fund amounting at the present time to over $20.00. The total amount which is raised in this way will be sent to Telegraph Age in time to be recorded in our next issue. It is hoped that other offices will be inspired by the action of the Philadelphia office and start similar subscription lists.

The amount received to date is: Previously acknowledged, $226.50; Charles H. Davis, $5.00; Patrick B. Delany, $5.00; A. Winder, $2.00; E. C. Boileau, $5,00; "Cash" from a friend through E. C. Boileau, $5.00; Chas. E. Hendrickson, $2.00; a friend, through W. J. Dealy, $10.00; Colonel W. R. Plum, Lombard, Ill., $10.00. Total, $270.50.

The Pennsylvania School for Telegraphers.

Encouraged by the success attained by the students who have graduated from its school of telegraphy at Bedford, Pa., the Pennsylvania Railroad will endeavor to secure this fall the largest enrollment the school has enjoyed since it was established in 1907.

Being located at the headquarters of the Bedford division, the telegraph school has the personal supervision of practical railroad men—present officers of the Pennsylvania Railroad Company—while Mr. J. B. Fisher, superintendent of telegraph at Philadelphia, is in charge of its operation, with C. F. Emerick as resident manager.

That the students may have the opportunity to become thoroughly versed in railway business before attempting actual work, the regular wires of the Bedford division are run through the school room. Standard train-order blanks are furnished, that this feature of operating trains may become familiar to the students.

The text books used consist of the book of block signal rules, the book of rules for the government of the transportation department, copies of all standard forms of Pennsylvania Railroad blanks generally used in the keeping of station agents' accounts, and other standard literature used in carrying on the business. In addition to this, students are instructed in the general duties of an agent in administering the affairs of a station.

The time required to complete the course is from six to eight months, and immediately upon its completion graduates are provided with salaried positions in direct line of promotion. The bulk of the expense of the school is assumed by the railroad company, as the cost of the course to the student, $2 monthly, is merely nominal.

Since the school was established there have been enrolled a total of 218 students, of which number 117 have graduated.

Mr. Charles H. Bristol, general superintendent of construction of the Western Union Telegraph Company, New York, in renewing his subscription to Telegraph Age says: "The Age is like a pair of suspenders: It fits any telegraph man."

Telegraph Age.

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OCTOBER 1, 1909.

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

The Relation Between the Telegraph and the Telephone.

We publish elsewhere in these columns a letter from one of our old subscribers suggesting that we enlarge the scope of Telegraph Age to include the telephone field as well as the telegraph. This is by no means the first suggestion we have had to this effect, as similar communications to us have been numerous during the past year or two. These expressions of opinion, coming as they have from widely separated sources and from those employed in various lines of endeavor, both in the telegraph and telephone fields, have helped to strengthen our belief that the two industries, which have an ever increasing common interest, might both be served to their mutual advantage by a publication which recognized the close relations existing between them. One who has observed at all closely the situation in both fields during the past few years readily appreciates the gradual convergence of the two systems. The development of successful composite apparatus whereby wires could be used for telephoning and telegraphing at the same time has forged one of the strongest links in the connecting chain. As a result of this the telephone companies have found it expedient to call into their ranks many recruits from the telegraph. The number of such employes has increased greatly in the past few years until now a large element in the telephone operating staff has the most friendly feeling for the telegraph and would be glad to see the two interests united. Another connecting link is found in the introduction of the telephone for train despatching. The railway telegraph superintendents of this country, who have the supervision of upwards of a million miles of wire used entirely for telegraphic purposes, now have added to their other duties that of looking after telephone despatching circuits. These men have almost without exception arisen from the ranks of telegraph operators and while the new methods will demand a large part of their time and attention, they will retain a strong affection for their first love, will still have telegraphic matters to occupy their energy and will, we believe, look with favor upon a publication which endeavors to serve them in the entire field in which their energies are employed.

Even the fire alarm and police telegraph superintendents are turning to the telephone to meet the exacting requirements which a successful fire-alarm or police patrol system demands.

Thus while we have been hearing many rumors in financial circles in regard to a contemplated union between the two great industries we see that such a union would have many practical reasons to justify its accomplishment. Why should we have one set of wires for telegraphing and another for telephoning, when one set will answer both purposes? Why also two separate pole lines to maintain and two offices in the hundreds of small towns when one is all that is necessary? These are some of the questions asked in this connection. The same problems of plant construction and maintenance which confront the telegraph engineer also have to be solved by the telephone engineer, and in fact the two fields now overlap to such an extent that it has become impossible to draw any definite dividing line between them.

Leisure Proves a Burden.

According to M. C. Keefe, who as an inspector for the Interstate Commerce Commission, has recently visited many railway telegraph offices west of the Missouri, the operators whose working hours have been reduced by law from twelve to ten or eight hours, have found nothing to do with their extra hours of leisure and find that the time hangs heavy on their hands.

Mr. Keefe does not quite say that the men are clamoring violently for a return to the old system, but, he states that they seem to have neither the ambition to utilize in study the hours newly

placed at their disposal nor the ingenuity to invent amusements with which to fill the lagging time.

In explanation of this truly remarkable state of affairs, Mr. Keefe says that the ranks of the operators are not now, as formerly, recruited from the sons of farmers, who took employment merely as a means of continuing their studies, and worked at their books during the frequent periods when their instruments were silent and they had nothing either to receive or send over the wires. Nowadays the operator who studies is almost unknown. In the vast majority of cases he is a city-bred boy, with only the bare rudiments of an education and no realization of his need for more. He often becomes an expert in the manipulation of the telegraph key, but it is practically impossible for him to rise further than a position in the train despatcher's office, since he lacks the sort of information which would render him capable of participating in the management of the road.

The Railway Age Gazette, in commenting upon Mr. Keefe's report, says, in part:

"The problem is to change the 'average' young telegrapher into an ambitious young telegrapher, bearing in mind that the task is probably more difficult than it would have been a generation ago, not only because of the greater influence of the city, but also because of the difference in native characteristics which has come about in our rural population during the last twenty-five years.

"Probably a traveling promoter, going about like the 'organizer' of a labor union, would be a necessary feature in starting any movement to induce young men to change from an easy to a strenuous life. Such an agent would be necessary, or at least highly desirable, in order to insure as nearly as possible general participation and uniform progress, and to promptly clear away obstacles, real or imaginary. The correspondence-school idea is good as far as it goes, and indeed would be an essential feature; but emulation is a vital element in any general scheme of education and whatever might be necessary to insure this should be regarded as an essential. The task of the organizer would be to direct the energetic and to show first steps to those not well enough informed to be fired with ambition. The young telegrapher should, of course, do his best to cultivate his mental powers, regardless of what his future is to be. As a rule, however, efficiency in the railway service should be the goal. The operator who gives himself a broad training will often stand a good chance in the traffic or accounting department; therefore he should not be discouraged if vacancies in the operating department come slowly."

Legal.

According to the opinion of the Supreme Court of Oklahoma, rendered September 15, when delay in the delivery of a telegram sent by an agent and signed by him causes a loss to his principal in the transaction, suit to recover damage must be instituted by the person whose name was signed to the telegram, and not by the principal. This opinion reverses the former decisions of the Supreme Court as well as the dedecision of a lower court.

Judge Seawell, of the California Superior Court, denied recently a motion to dismiss an injunction against the Commercial Cable Company. The injunction was obtained by the former company to avoid paying charges for a new date and the words "via San Francisco" upon messages delivered by the Western Union to the Commercial Cable Company at San Francisco for transmission by the Pacific Cables. The grounds upon which the decision was made were that the same charge was not made to the Postal Telegraph-Cable Company, and that consequently unjust discrimination was used. The case will probably be carried farther by the Commercial Cable Company and an attempt made to show that being owned by the same interests as the Postal company they are entitled to discriminate in their favor.

Western Old Time Telegraphers.

The Western Association of Old Time Telegraphers held its annual reunion at Portland, Ore., September 25.

A general plan of reorganization was suggested whereby each city will organize a local association, who in turn will elect delegates to a general convention, which will be held in the different cities chosen for the purpose. A movement was inaugurated to establish this date on April 27 of each year, this being the natal day of Professor Samuel F. B. Morse, who was born at Charlestown, Mass., on April 27, 1791. An elaborate program of entertainment was arranged at Portland for the occasion.

We are in receipt of two post card photographs of interior views of the main office of the Postal Telegraph-Cable Company at Pittsburg, which were taken by Assistant Manager Colebrook and reduced to post card size by the father of Mr. T. J. Hoge, night wire chief. The work is most excellently done and the cards make attractive souvenirs.

An interesting paper on multiple telegraphy was presented recently by M. Mercadier before the French Academy of Sciences. The author has formerly shown that several telegrams can be transmitted simultaneously along the same line, consisting of two wires, by means of superposing alternating currents of different frequencies upon each other and also superposing at the same time direct-current impulses upon the different alternating currents. They have now studied whether the same results could be obtained with a line consisting of a single wire grounded at both ends. This experiment was made between Paris and Lyons. They were successful and could overcome the effect of the earth currents at Lyons, where they are particularly strong.

The Atlantic Cable of 1858.

To the Editor of Telegraph Age:

Sir: Before replying to the second somewhat lengthy article of Mr. William Maver, Jr., I desire to say that having now re-read his first article I recognize that it has many merits, notwithstanding the disadvantages under which it was put together. Moreover, on again reading my letter commenting thereon, I regret that I expressed myself in the precise terms I did. It seemed to me, however, at the time that Mr. Maver was taking up a somewhat critical and scarcely justified position regarding a great pioneering work; for I must admit that I was not familiar with his name in connection with submarine telegraphy. I find, however, that Mr. Maver is a leading authority on land telegraphy, and is the author of several famous works and papers dealing with his subject. I was partly misled by the letters "Jr." after his name, which in our country would suggest youthfulness rather than anything else. My original view of Mr. Maver's first article was accentuated, as I explained by the mis-spelling of names. I had thought that this feature was common to the article in your journal and also to its appearance in the Electrical World; but I now find that the name "Elliott" is the only name mis-spelled in both. This should be spelled with one t only, for Sir George Elliot, of Glass, Elliot and Company, should not be confounded with Elliott Brothers, though working somewhat in the same sphere. In my comments on Mr. Maver's first article I should have added that the ultimate failure of the first Atlantic Cable might, of course, be largely due—as suggested by Mr. Maver—to "the inexperience in cable making at that time," though the high tension electricity, with induction coils, employed during the working of the cable was, in my opinion, more directly the cause. Before leaving this previous letter of mine, and in view of a suggestion made by Mr. Maver, I would repeat what I previously implied, i. e., that this first letter was written as soon as I happened to see Mr. Maver's first article.

Turning to his second article, I observe that Mr. Maver has taken occasion to examine some of my books as well as much else connected with the subject; but I regret that it will not be possible for me to deal with all he has to say in detail in the course of his second article. I must, indeed, confine myself to the general trend of his views—more especially concerning the points I touched on in my previous letter.

First of all, with reference to some of Mr. Maver's early suggestions—for which I bear him no ill will under the circumstances—I would mention that my father was knighted September 4, 1858 (a fact which can be verified at the Lord Chamberlain's office in London) exactly a month after he had completed his work of laying the First Atlantic Cable. I would point out, too—in view of the line how openly taken by Mr. Maver —that my father would scarcely have been offered a baronetcy in connection with subsequent work, if the suggestions now made by Mr. Maver were borne out by facts. (The further honor referred to was refused for pecuniary reasons.)

Mr. Maver speaks of the repeated "coiling and uncoiling" and also of the "cutting and hacking to which the cable was subjected before its submersion in the effort to localize and remove defects." It should, however, be remembered that neither coiling, uncoiling or cutting a cable are seriously debarred in submarine cable work. I agree with Mr. Maver to a great extent in regard to his remarks on the heating of the cable by exposure to the sun. He is, perhaps, however, unaware of the conditions of the contracts and the circumstances under which the work was carried out. Insufficient capital and time (for which none of the technical officials were responsible) explain the non-adoption of a number of my father's recommendations, including not only a much larger cable (ultimately adopted on the second and third Atlantic lines), but provision for the line being kept constantly under water. Still, it has to be remembered that if a cable contains incipient faults, such as do not reveal themselves ashore, its defective condition is soon made evident on submergence at the depths of the ocean. In the case in point, however, the failure of the line was a gradual one. The cable appeared, indeed, to be fairly healthy—comparatively speaking—up to the time when it was handed over for working from each end.

I regret to find that Mr. Maver considers that I have been unfair to Dr. Whitehouse, a very able physician who took up the subject of ocean telegraphy warmly though only temporarily. This was very far from my wish, for he was a man of many charms, notwithstanding ill health. It has, however, to be borne in mind that the apparatus he applied to the cable when handed over to him for working through from shore was entirely opposed to the strongly expressed views of Professor Thomson, as well as of my father, both at the time and previously in the course of a correspondence which followed on some letters published in "The Athenaeum." [These letters revealed the fact that Dr. Whitehouse favored a small conductor for a long length of cable.]

Mr. Maver considers that I have misquoted the sense of Professor Thomson's and Mr. Varley's views on this point; but with all deference to him (Mr. Maver), I cannot see that my abridgment of their views constitutes a material difference in their actual nature. Moreover, Professor Thomson had previously expressed himself sufficiently definitely in the correspondence already referred to, as well as later—if not actually when giving evidence. Further, if there was then any doubt on the suitability of high tension currents and induction coils for working cables there is certainly none now. I do not think Mr. Maver quite followed my point in his reference to what I said in my books about the breaking

down of the 1865 and 1866 cables shortly after they had been laid. Faults soon appeared in these lines, but the faults—at specific points—were of a nature that could be repaired; whereas there was every appearance of a gradual and more or less uniform breaking down of the first Atlantic Cable throughout its length, as it received its increasing doses of high tension electricity. Mr. Maver seems to favor the idea that the breakdown was due mainly to the application of tar outside the cable; but, without denying that this might well have been a contributory cause, it may be pointed out that, with the exception of the 1865 Atlantic line, every cable laid has since been covered with a tarry compound as a preservative against decay. On the other hand, the Whitehouse transmitting and receiving apparatus has never been employed for working any cable since that of 1858. Mr. Maver comments on the fact that, in my books, I have not quoted Mr. W. T. Henley's views as to the cause of the failure. I would, however, mention that—like Mr. Maver, apparently—I have sifted the evidence to the best of my ability and have quoted that which most appeals to me as a result of the sifting. Whether Mr. Maver's views or my own are correct I am not prepared to say, though I think I may claim that my views are, at any rate, equally well backed up by other authorities and by subsequent experience. I am, of course, fully aware of the importance of a cable being tested under water during manufacture, and can scarcely be accused of ignoring Mr. Henley's opinion for filial reasons, seeing that this was one of the first precautions pressed for by my father. It should, perhaps, be added that Messrs. Glass, Elliot and Company on the one hand and Messrs. R. S. Newall and Company on the other, were responsible for the manufacture of most of the pioneer submarine cables—with greater experience than their rival, Mr. Henley—and that the former firm (subsequently the Telegraph Construction and Maintenance Company) have manufactured more of the succeeding cables, now at the sea bottom, than any other firm. Though I do not think it is a point of much importance, I would mention—as Mr. Maver raises the question in this connection—that Mr. C. V. Walker (an honored name in telegraphy) was not a director of the Atlantic Telegraph Company. Mr. Maver quite naturally draws attention to the fact that in "Submarine Telegraphs" I mainly attributed the failure to faulty metallic joints rather than to the apparatus employed for signaling through the line when laid; but when I wrote the book in question I had not an opportunity of examining all the official papers now in my possession. Mr. Maver also quotes from the report of the Committee appointed to inquire into the construction of Submarine Telegraph Cables, and remarks that it is strange that I have not done so in any of my books. I have, however, made several references to this inquiry, without actually quoting the particular passage in the report that he draws special attention to. In case anyone attaches special significance — such as appears to be suggested—to my not setting forth in my works this particular clause of the report, I would ask him to consider, or inquire who had most to do with the laying of subsequent submarine cables, whether for Government or otherwise. In this connection it may be worth quoting a distinguished telegraph engineer and electrician, Sir Henry Mance, C. I. E., past president of the Institution of Electrical Engineers, who in the course of his address regarding Submarine Telegraphy in 1897, remarked: "If we, as engineers, desire to do honor to any one individual who pre-eminently distinguished himself in the development of oceanic telegraphy, we have simply to refer to the list of our past-presidents and select the name of Charles Tilston Bright." I cannot quite follow Mr. Maver's meaning where he says: "By the way, my critic's chief witness, Mr. Varley, joined in signing this verdict." I am entirely with Mr. Maver in his high regard for Varley as an electrician—indeed, next to Lord Kelvin no man did more for the satisfactory electrical working of cables than Varley on the one hand, and Willoughby Smith on the other. But Varley — like Galton, Wheatstone, Fairbairn and Bidder—was not associated with ocean cable laying or with the manufacture of cables. The electrical members of this committee—especially Varley and Latimer Clark—would, however, be excellent authorities on the effect of the Whitehouse apparatus on a cable; and they were certainly unfavorable to high tension electricity for working the Atlantic line. As regards the joint experiment of Varley and my uncle, to which Mr. Maver alludes, this seems to me to point rather in favor of my view than otherwise. In a word, I still beg leave to differ with Mr. Maver respecting the cause of failure; and while recognizing the importance of much that Mr. Maver sets forth, I venture to think that a study of the entire evidence—including that of Professor Hughes and Professor Wheatstone—could be turned in favor of my views as much as his. The complete abandonment of the Whitehouse apparatus (together with personal reasons) was, perhaps, sufficient reason for the Committee omitting to set forth the unfavorable effects of such apparatus on an insulated wire of this character. However, I quite recognize that faults of manufacture—due to lack of experience—are very likely to have existed in the cable before it was actually worked through, though, in my opinion, no cable of similar dimensions would have stood the operation for long with the said apparatus in use. Moreover, from the particulars I have available, it certainly appears probable that the cable would have worked satisfactorily for a considerable time but for these high tension currents.

Mr. Maver is critical about the paying out gear on the "Agamemnon" and the "Niagara." With all due deference to his opinion, I cannot see that

it is substantially supported by Sir Samuel Canning (my father's chief assistant), while Captain Moriarty — the distinguished navigator whom Mr. Maver also quotes—had nothing to do with the working of the apparatus or the laying of the cable.

Mr. Maver takes me to task for stating that Brett and my father had preceded Cyrus Field in projecting the Atlantic Cable. Let me assure Mr. Maver, however, that whatever I said on the subject was not at all from the point of view that he attributes to me, but was intended rather to show that others besides Mr. Cyrus Field had been working at the idea, when the latter gentleman—a famous American merchant peculiarly gifted with intense energy and industry—came over to this country and sought Brett and my father. Still, here again, I must admit that I had not done justice to Mr. Maver's original article which was, I see now, quite temperately expressed in this matter—as compared with what I have often seen. On the other hand, I am afraid I cannot quite fall in with the view adopted in Mr. Maver's further article in this regard—i. e., where Mr. George Saward's evidence is quoted in reference to the origin of the Atlantic Telegraph Company—if only for the reason that the formation of the company followed long after a good deal of investigation and other preliminaries in this country, as well as in America, where Gisborne was especially forward in the matter. Mr. Saward was not in a position to speak with authority regarding the work that I refer to in his country, for his connection with the subject commenced when he became secretary to the Atlantic Telegraph Company, with Mr. Cyrus Field (the general manager) as his immediate chief. But Mr. Field's energy was turned to account in a way that will never be forgotten in England—any more than in America—and though the capital (so far as it went) was mainly raised in England, this was not for lack of strenuous effort and noble support on the part of Field.

Mr. Maver avails himself of the opportunity in his second article to recount the important services of Mr. W. E. Everett, U. S. N., in regard to the first Atlantic cable; and I am sorry to find that he also takes occasion to express the view that I have not done that distinguished officer proper justice in my books. Mr. Maver has evidently arrived at the conclusion that Mr. Everett was in "sole and responsible charge on the 'Niagara' of the successful laying of one-half of the cable in 1858;" and he gives his reasons. These are quite in keeping with the records of Mr. Mullaly (a well known American journalist and author) a glance at whose writings would lead a reader to suppose that Mr. Everett was the engineer-in-chief and my father only an assistant. Mr. Maver also, quite properly, quotes from official correspondence which tends to give color to the idea. It is made clear, however, from further correspondence—as well as from the reports of the expedition to the board—that Everett acted in the capacity he did on the "Niagara," under instructions of my father, the engineer-in-chief of the whole undertaking (who obviously could not be on both ships at once), as did Mr. Woodhouse also, and in precisely the same way that Mr., afterwards Sir Samuel, Canning and Mr. Henry Clifford did on the "Agamemnon." That clever engineer, Mr. F. C. Webb (one of my father's staff on the 1857 expedition), was not available subsequently, and it was in this way that, at the instigation of Mr. Cyrus Field, Mr. Everett joined the engineering staff.

Mr. Maver also considers that I have not done Mr. Everett proper justice in my books in regard to his association with the paying out apparatus. I can only say that I dealt with the subject to the best of my ability—based on a great many official documents, and have certainly had no such intention as appears to be suggested. Through his countryman, Mr. Field, Mr. Everett (who had been the chief marine engineer of the Niagara on the 1857 expedition) became a member of the Advisory Committee relative to the proposed paying out gear for the 1858 expedition. Of the other three members, one was the chief of the Steam Department in Her Majesty's Navy, and the other two leading engine makers. The design of this apparatus (fitted to both vessels) was worked out by my father (as the responsible Engineer-in-Chief) in conjunction with Mr. C. E. Amos, of Messrs. Easton and Amos, who constructed the gear. It was arranged that Mr. Everett should supervise the construction and fitting of the gear, in view of the fact that it would be under his charge, on the Niagara; and it was on this latter account—as well as owing to his knowledge of machinery connected with ships — that he was attached to the said committee for reporting on the new designs. If, however, any of your readers prefer to consider that this distinguished naval officer (Mr. Everett) was as much in charge of the laying of the first Atlantic cable as my father, or that he was solely responsible for the design of the paying out apparatus, they are welcome to do so; just as they are also welcome to a preference for the versions of Mr. H. M. Field and Mr. Mullaly to my own. The perfectly natural rivalry of nations would in itself be sufficient explanation, no doubt. I can assure you, however, that any words of mine on the subject in my various works have been the results of a dispassionate and laborious sifting of evidence from official documents—published and unpublished.

Though I cannot agree with several of Mr. Maver's conclusions, I desire to repeat that on a second reading I realized his original article was a fair summary, and that I should have expressed my previous letter—regarding certain portions of Mr. Maver's remarks—in more moderate terms. Further, I quite recognize now (notwithstanding some of his unfavorable criticisms) that he has closely studied the subject as far as was possible for him to do. I see that in using the term "ex-

clusive"—in reference to the basis of my writings—he puts the word in inverted commas. I would, however, say that this phrase has never been employed by myself in this connection, though certainly my contributions to the literature of the subject are based on official documents, many of which have never been published.

I am much obliged to Mr. Maver for pointing out an apparent discrepancy in my "Submarine Telegraphs." I am far away from that somewhat ponderous volume at present, and can only account for the discrepancy by the fact that different batteries were employed at different times during the 1857-8 expeditions, the particulars of which I had, as it happens, from Lord Kelvin himself—the previous Professor Thomson that Mr. Maver quotes.

Finally, I am sorry to find that Mr. Maver and myself are at "loggerheads" in the distinction between an "engineer" and an "electrician." I cannot help thinking—notwithstanding what Mr. Maver says—that this must be due to a difference in American and English usage of the words. In Submarine Telegraphy, at any rate, we do not speak of "electrical engineers." Aboard a telegraph ship there is the engineering staff and the electrical staff, those on the latter being termed "electricians;" and I venture to submit it was always so. I note, by the way, that further on Mr. Maver, seemingly, apologizes for confusion between engineers and electricians—i. e., between those who "merely laid" cables and others. While, of course, endorsing Mr. Maver's views of Lord Kelvin and Cromwell Varley, I do not think that Lord Kelvin himself was inappreciative of those who "merely laid" cables—such as my father—judging from his Lordship's remarks regarding the latter at executive meetings of the International Memorial to the Inception and Extension of Submarine Telegraphy, as well as on other occasions when speaking of the Atlantic cable and subsequent enterprises with which my father was responsibly associated. Sir Henry Mance's views in the same regard I have already quoted.

Permit me to conclude this communication by cordially re-echoing the wish of her late Majesty Queen Victoria in regard to the Atlantic Cable being "a bond of perpectual peace and friendship between the kindred nations," hoping that any difference of opinion between Mr. Maver and myself may be happily smoothed over—if only on the principle that "it will be all the same a hundred years hence."

Charles Bright.

September, 1909.

P. S.—The foregoing has been written while on holiday in the wilds of Surrey. Thus, like Mr. Maver's original article, it is put together under some disadvantage. On the other hand, but for the conditions I fear it would have been impossible for me to make any adequate reply to Mr. Maver's more lengthy article. This I was anxious to do if only out of courtesy, and in justice to Mr. Maver. Realizing that the last word would, by right, rest with me, I have made a point of expressing myself this time in moderate terms and in a way, I think, that no answer would be called for. But if Mr. Maver is intent on the last word, he will certainly have the advantage of me, for in a week or so I expect to be fully engaged on more important matters than a discussion concerning the pioneer days of Submarine Telegraphy, and this expedition will probably take me out of touch with post and papers for some time to come. C. B.

Submarine Telegraphy.

Mr. S. G. Brown recently delivered an address before the Royal Institution, London, on the fundamental principles of modern submarine telegraphy, which has been abstracted by the Electrical World. The author explains the time rate of signaling as determined by the K. R. law, gives data on the resistance and capacity, etc., of various cables, discusses the attenuation in a cable, and the method of duplex working, and then describes receiving and transmitting instruments, dealing especially with the progress made by the invention of the drum-cable relay and the magnetic shunt. He finally gives some notes on experiments made in 1908 with his high-speed system of working. With the new method, using a special relay, traffic has been carried continuously duplex at 230 to 240 letters per minute. "The principle of operation is as follows: When a submarine cable is forced beyond its normal speed of working the quick-changing signals, such as make up the letter C, are the first to fail, or, in other words, do not arrive with sufficient strength to work the receiver. It was found on trial that allowing more of the current from the cable to flow through the receiver—say, by increasing the size of the receiving condenser the first and last signal of a series of reversals could be obtained with sufficient strength to work the relay efficiently. The relay, once started, is arranged to bring in fresh energy from its local battery, through a special retarding circuit, to add to the strength of the quick-changing currents on its own coil and thus the reversals are made strong enough to give a good record, which without this aid they would have been unable to do. By these means weak signals are built up at the receiving end of the cable, and the speed of working can be thus materially increased. It is fortunate that the class of signals that has the greatest difficulty in getting through the cable is the easiest to be added to when received. The 'high-speed' relay works, therefore, not from the signals received from the cable only, but also from those that it transmits through its own local circuit, the record that it makes being the combined action of the two."

The Military Telegrapher in the Civil War.

PART XXVIII.

Con Dwyer served in the Nashville office of the United States Military Telegraph Corps during a large part of the war, for a part of the time as manager of that office. In writing to Colonel William R. Plum, the historian of that organization, in 1878, he gave the following interesting account of his experiences while thus engaged:

"I was ordered to Nashville immediately after the fall of Fort Donelson, being detained a day for the train, which was awaiting the arrival of Andrew Johnson, who was then en route from Washington to assume his new duties as Military Governor of Tennessee. Upon the arrival of Mr. Johnson the train was all ready to start and quite a crowd had gathered from the almost depopulated town. Some railroad man jumped upon one of the cars and swinging his hat called for three cheers for the patriotic senator, but not a ripple stirred the throng. They were all on the broad grin, however, and Andy took it good naturedly and smilingly bowed to them.

"The train was the only one south of the Barren River and was about the worst specimen I ever saw. The governor had the best car, of course. He was honored with a seat in a box car, the dirt from which had been shoveled out; while the rest of us herded on open flat cars with our grip sacks for seats. There were four of these cars, not overcrowded.

"The locomotive was patched up from the odds and ends found in the ruins of the roundhouse at Bowling Green and which had contained, perhaps, a dozen fine engines when destroyed by the Confederates. The engine had no cab, no head light, no cowcatcher, and her smoke stack gave her the appearance of being a total wreck. She was a self-propeller, however, and even had strength enough to pull the few cars of her train on level track, but when it came to a little grade she was not equal to it, and we herders had to get off and foot it to the top of the hill.

"We reached Edgefield late at night and started down to the pontoon bridge over the river bottom lands, where we had our first experience with army mud. Crossing the Cumberland and climbing the hill we found ourselves in the public square of the city. The place seemed to be totally deserted. We saw a light in one direction only, and approaching it found the City Hotel, where, on inquiring for rooms we were blandly smiled upon. Ascertaining the way to the telegraph office, I found Samuel Bruch and Sargent Peabody who greeted me heartily, and Mr. Bruch took me to his splendid quarters in the Catron mansion.

"Mr. Bruch had just succeeded in getting one wire across the Cumberland. It was a small steel wire, swinging clear of the smoke pipes of passing steamers, stretching from the high piers of the iron railway bridge that had been destroyed only a few days before by the retreating Confederates. This was attached to one of the wires leading into the old Southwestern Company's office on Cedar Street, where instruments and battery were found all ready for use. The southern operators left the office undisturbed, and, indeed, we found Mr. Carville, the old manager, in his room at the rear of the office.

"This old gentleman was a fine specimen of the olden time manager, of whom scarcely any exist at the present day. He was not a telegrapher. He formerly had been an accountant, and his duties as manager were those relating to the accounts, leaving the management of the wires to the operators.

"The office certainly was a curiosity. It would astonish some of the fastidious ladies and gentlemen of the present time. If there ever was an era of telegraphy known as the year one, that must have been the period from which that Cedar Street office dated, and the rubbish and accumulations were all there.

"The instruments were placed upon a table breast high, extending across the room by the front windows, and over the table was a frame on which ran a network of wires, and which answered the purpose of a switchboard. From this primitive switchboard, the wires ran to thumb screws and thence to the instruments. These were the old-time high resistance magnets with registers, all of them of the best make.

"There was a good supply of battery material and office supplies on hand which had been accumulated by the company before the war actually broke out, in anticipation of the blockade that followed. An inventory having been taken of these supplies, they were distributed to the military offices as fast as opened south of Nashville, and charged up to the Government..

"The provost guard reporting the discovery of a quantity of wire in a warehouse on College Street, we found about seventy miles of unfinished wire of home manufacture there and took possession of it.

"The army was advancing slowly on the Franklin pike roads towards Columbia, the left wing under General O. M. Mitchell sweeping to the left towards Murfreesboro and Shelbyville. General Buell still remained in Nashville organizing a grand depot of supplies and preparing to make that city what it was afterwards, a great military magazine and base of operations.

"Newton Crittenton was sent out with General Mitchell's column as operator. Mitchell pushed forward from Shelbyville and made that famous dash upon Huntsville, Ala., for which he was applauded by the War Department and denounced by the military men. After having captured that section of the Memphis and Charleston Railroad, together with a few locomotives and cars, he burned the bridge crossing the Tennessee, thus cutting himself off from any chance of a junction with the main army by means of that road. Crittenton reopened the line from Decatur Junction to Stevenson, along which a

few small military posts were established. He had this territory all to himself, having no communication with Nashville, except by courier to the end of the line a little south of Murfreesboro. Meantime a gang of men rebuilt the line on the Nashville and Chattanooga Railroad, but were stopped a short distance south of Murfreesboro, while every effort was being made to keep the telegraph abreast of the advance of the main body which was moving towards Savannah, or Pittsburg Landing, on the Tennessee River. The line on the pike road, as far as Columbia, was the old Louisville and New Orleans wire, and was broken in only a few places, but after passing Columbia the route was through a comparatively new country and an entirely new line had to be constructed. By this time the armies were closing up, Grant moving up the Tennessee and Buell south from Columbia, while Beauregard and Sidney Johnson were concentrating their forces at Shiloh Church on the left bank of the river. The line had to be rushed ahead, and as a consequence, in that early day in the history of the military telegraph, and its imperfect organization, the line could hardly be said to have been constructed at all. The wire was carried through dense woods and fastened to the trees, some times with insulators and often without.

"It was found to be a tough old string to work, but we managed it. We arranged a switch beside the key connecting with the main battery so that, in one position (while sending), the full force of the battery went to line; and in the other (while receiving), only a small portion of the battery went to line. We found this to work much better than by throwing the line from battery to ground.

"In this manner the vast business of the armies was kept up. During the operations preceding and succeeding the battle of Shiloh that wire was in use night and day. Sargent Peabody, Ellis Wilson and Claude Knox were the operators, afterwards reinforced by W. R. Plum. We had no hours, a man took hold and worked until tired out when another relieved him. One man for Louisville and another for the front and the other taking the necessary sleep. Peabody would sometimes take a turn at the Government accounts.

"About two months after the battle of Shiloh, Mr. Crittenton returned to Nashville. Bragg had commenced his great flank movement against Buell through Cumberland Gap into Kentucky. Buell fell back on Nashville and finally it was a race which should reach Louisville first, Buell or Bragg.

"H. W. Plum joined our Nashville force about this time and was appointed chief operator. During the operations in Kentucky, General Negley was left in command at Nashville, with the expectation that Bragg would soon be driven whence he came and that the operations would shortly be resumed south of Nashville and the Nashville and Chattanooga and Nashville and Decatur Railroads be reopened, fortifications around Nashville having been in course of construction all summer, by impressing every negro to be found able to handle a pick or shovel, and horses, mules and carts. Over 4,000 negroes were at work at various times and the works were still incomplete.

"We constructed a line connecting the various forts and military headquarters, placed a regular relief of operators in each so that General Negley could receive reports day or night of anything transpiring along his front, and it was expected that he would be enabled to direct the operations of his troops from Fort Negley in case of assault; that fort being the key and commanding the whole sweep of country including the city and the river north of it. No opportunity was ever given the boys to distinguish themselves in this line of military telegraphy. The enemy outside did not deem themselves strong enough to attack such a line of fortification.

"The quarters for the telegraphers were not very inviting, the forts being unfinished. The wires were run in through the casements and the instruments, when in use, placed on ammunition boxes. We were shut up in a state of siege for three months, and on quarter rations. Finally fifteen of the men put a much discussed resolution into shape, and being furnished with a horse, saddle and bridle, and $15.00 each, they started for Louisville. The horses were from the corral of condemned horses (10,000 horses and mules were starved to death rather than turn them loose to fall into the hands of the enemy). The fifteen men had passes through our lines, but they were not good through Dick McCann's. They encountered Dick about twenty miles out from Nashville. His men were poor and badly mounted and they at once traded horses and saddles with our adventurers and helped themselves to the greenbacks. It is said that some of the boys lost heavily in that engagement, having been either provident or lucky, they turned over a goodly pile of greenbacks to the impecunious guerrillas. Some had to doff their fine riding boots and take in place worn out Confederate rawhides. At all events the party was placed in a sad plight but was somewhat thankful that the guerrillas did not want to be bothered with prisoners. Parting company with Dick and his brigands, they struck out for Owensboro, Ky., 110 miles distant, where after begging their food from negroes through a hostile country, they arrived, footsore, weary and hungry, and there took boat for Louisville, where they were soon made happy by receiving their pay and getting a chance to go home. I cannot recall the names of all of these men. Peabody and Kelsey were among them.

"Everything remained quiet except for the adventures of foraging parties ocasional alarms and any amount of rumors, until General Rosecrans arrived. That general came to the army of the Cumberland flushed with success won in West Virginia, as it was said he was the only General

who outmaneuvered Lee, and the soldiers at once began to call him "Old Rosey" affectionately. He had experience of the utility of the telegraph in the Kanawha region. He assured me personally that he appreciated fully the importance of the telegraph and desired me to assure the boys that he would do everything in his power for them. I believe the general was in favor of attaching the telegraph to the army in the closest manner. Having a number of men still left, it was arranged with the general to assign one to each division and two to each 'wing' headquarters (the army then being known as the 14th Army Corps, consisting of the right wing under McCook, the left under Crittenden and the center under Thomas).

"We began preparing for operations southward once more and had gangs ready to repair the old line to Columbia again, also the line on the Nashville and Chattanooga railroad. Finally the advance was ordered and the battle of Stone River was fought. During this seven-day battle, Philip Bruner and Pat Mullarkey, being the operators attached to Rosecrans' headquarters, rode with the staff and attended to all correspondence for the telegraph. I might say all correspondence for there could hardly be any other. A great deal was in cipher, of course. Couriers were in readiness at all times to be sent to the point where the builders were at work and who were accompanied by operators who kept up communication with Nashville. Augustus Fuller was one of the operators with William L. Tidds' party of builders at Lavergne. When Wheeler's cavalry turned the left flank of our army and made a dash on Lavergne, destroying one hundred and fifty wagons loaded with ammunition en route to the front, Fuller beat a hasty retreat. He had a splendid mare (a present from General Crittenden to whose staff he was assigned), and he determined to save her, and himself, too. Thrusting his instruments into the saddle bags and jumping into the saddle he started for the woods, but when he neared them he was saluted with the sharp cry, 'halt!' Poor Gus was captured and his mare, too. Wheeler, however, was in too much of a hurry to bother about prisoners, but he took the mare. Tidd lost an arm in this affair; it was carried away by a cannon shot while the enemy was shelling the village before their cavalry dashed in.

"After the battle of Stone River, Colonel Van Duzer took charge and soon became a great favorite with General Rosecrans, and I may as well add that the military telegraph, as well as all other departments of the army, only about this time began to take organized shape. It was notorious when Rosecrans was asked by Lincoln what he could do for him and his gallant army, replied: 'All I ask is that you furnish my men with a uniform arm. I almost lost Stone River by the difficulty of keeping up ammunition.'

"Once while I was in Nashville, Colonel John H. Morgan, the Confederate cavalry leader, crossed the Cumberland River at Hartsville and captured the Union garrison at Gallatin. Colonel Morgan was accompanied by his operators, Dudley and Ellsworth.' J. M. Brooks, who was our operator at Gallatin, was asleep at the time of the capture, and being awakened by a command to surrender, discovered a man on each side of his cot with pistols in their hands. He was ordered to open his offices, which he did, and Ellsworth soon controlled the wires. It being so early in the morning there was nothing going on except on the railroad wire. A freight train bound south was then near and entered Gallatin, falling into their hands.

"Brooks remained in the office under guard of a soldier, while Ellsworth worked the wire and consulted Morgan or some of his staff. The passenger train for Louisville was all ready to start on time from the depot at Nashville, but all knew that Morgan was in the neighborhood and would be likely to strike the road, so the train was held for information.

"About 7 a. m. on reaching the office, Peabody said something was wrong as he could not get any one. We, of course, suspected the wires to be in Morgan's hands and simply awaited developments. Finally Gallatin answered and I went to the key and asked if it was Brooks. 'Yes.' 'What news have you?' 'Everything O. K.' 'How is the down freight?' 'Here all right.' 'Guess not; that is not Brooks writing; who is it?' No reply. Calling Gallatin again I said: 'If it is Ellsworth at key I would like to say a word to Brooks, which you may say to him from me.' Thereupon he said Brooks was all right. There was then a good deal of chat on the wire, but nothing touching army movements, of course. We told him, however, that he might be sure he wouldn't get any train from Nashville as I explained to him that our knowledge the night before of his being in the vicinity stopped all trains. He asked me if I would take a couple of messages for General Morgan and deliver them. I said, certainly, I would deliver them myself and get answers. One was to A. B. Turner, the well known owner of the leading game in the city and the other to John Hugh Smith, the Mayor. The former told about Morgan's having had a splendid time a few nights previous when he won a certain sum and named the persons engaged. The other to the Mayor reminding him of the time when he was running for lieutenant in the Rock City guards and was the most boastful Confederate in Nashville and taunted him for want of fidelity to the one cause or the other.

"His honor blushed and stammered a good deal over the communication and said he would send me an answer. Turner was greatly pleased and showed the despatch to his friends.

"On my return to the office the wires were all grounded and the parties had gone. Brooks and his office were left unharmed, but the raiders tore up the track and burned the freight train."

The Atlantic City Convention of the International Association of Municipal Electricians.

The fourteenth annual convention of the International Association of Municipal Electricians met in the parlor of Young's Hotel, Atlantic City, N. J., September 14, 15 and 16. It was the largest gathering of members and exhibitors in the series of annual meetings held up to the present time. It was also the most important, the subjects discussed bearing on municipal electrical management being treated intelligently and in a thorough manner.

The weather was unusually fine during the entire meeting, which did much to make the gathering a success from the standpoint of entertainment as well as from the business point of view.

When the convention was called to order at eleven a. m., September 14, by President J. B. Yeakle, of Baltimore, over one hundred active and associate members were present. Mayor Franklin P. Stoy welcomed those in attendance in a very appropriate speech, indicating that he was fairly well posted in the requirements of those engaged in the electrical department of municipalities.

Mr. W. H. Thompson, of Richmond, Va., on behalf of the association, responded to the welcome extended by the Mayor.

President Yeakle then appointed a committee on exhibits, consisting of A. C. Farrand, Lester Kingsbury and C. E. Diehl.

At the afternoon session President Yeakle read his annual report, which was as follows:

"Presuming on your generosity, I have prepared for your consideration a brief review of the past, with some suggestions concerning the importance of the Association as the custodian, to some extent, of the interests represented in these annual meetings.

"In previous years the prevailing idea of the importance of our annual gatherings has been mainly concerned with fire alarm and police systems, with some recognition of the duties of the City Electrician as an accessory or allied subject. The conditions to-day require a more general view of the importance of electrical inspection, because of the many complications arising from the increasing demand for electrical installations required by the many and varied interests now recognizing its convenience, economy and efficiency.

"The duties of police and fire alarm superintendent, while furnishing the opportunity, have for some reason, failed to develop the municipal electrician from its ranks. The selection of engineers for the inauguration of underground service, under the impression that such work was remote from the overhead practice, was the introduction of a theory regarding municipal electrical interests that the employment of a class without practical training or appreciation of its importance, only, was competent to plan and construct the new methods, which embrace in its comprehension nothing more than a recognition of the manner of applying familiar rules to an altered condition of the subject concerned.

"The effort to standardize underground work from the point of view of the expert, was not successful, and although we recognize the value of scientific demonstration of the problems encountered, the practice to-day, as it might have from the begining, is the application of accurate knowledge of faults and their prevention, and remedy, reinforced with more familiarity with the construction and use of the volt meter and ammeter, following daily use of these instruments in the routine of work.

"But a brief period back of us the telegraph operator was thought to be the custodian of all knowledge regarding electricity and its application. It was to that class the promoters of the telephone looked for help in introducing that invention. A number of pioneers in electric light interests came from the telegraph office, and some of those who organized the National Electric Light Association were prominent in the fire alarm and police telegraph offices. Lack of training and lack of concentration of ideas around the offices in which they were engaged prevented the enterprise needed to obtain prominence in these fields, in the days of their infancy, so that they might enter and control the business soon to be advanced beyond the sphere of their influence.

"Those who were active in the formative period found it necessary to look outside our ranks, and the technical school became the objective point from which has come that force of laborers our indifference failed to provide. Theory became the important factor in the plans until the theorist had added to his value experience and the consequent results of numerous failures. The scrap piles around many of the factories bear evidence of the need of practical training, and the many and varied appplications of electrical power, while owing much to the technical influence that evolved the system under which progress was made, the commercial value of the subject to-day owes a debt to the ingenuity of men who did not know the relation of the units to which their inventions were often subjected. Some of the experts of this period were firing stationary engines when you and I thought we possessed all the knowledge of electrical problems worth while to acquire When arc lights were to replace gas lamps and coal oil burners, those men came into the field, and our assumed importance became a negligible quantity in the calculation of those who wanted broader men than we were known to be. These stationary engineers soon

learned more about the mysteries of our art than we knew were to be discovered. And learning a little, they hunted for more. They got in close touch with the developments, and pursuing, as we did not, their quest for information, gathered the seed which has grown into the splendid system governing the business at this time.

"From the few units we were familiar with, ohm, farad, volt, they have given us a list almost too long to memorize. While we were content with the force, volume and resistance, they have made comprehensible the effects of heat, reaction, phase relation, inductance, etc., and have standardized these various phenomena so that their relations to each other are subject to demonstration and proof. At the same time they have encouraged the efforts of all who would avail themselves of the advantages of the almost complete system of electrical practice the country profits by at this time.

"The International Association of Municipal Electricians must in the future take broader grounds. Specializing must be considered only as a means of utilizing the knowledge gained by a proper application of what can be learned in the more extended field of applied electricity. The municipal electrician must fit himself for recognition as capable of examining and reporting for the action of his superiors in whatever department he may be employed, on any question involving knowledge of the state of the art, its advantages, convenience and dangers as it may affect their interests. And while disclaiming any intention to deny their capacity for the work undertaken by them, I cannot resist the inclination to deplore the fact that after newspaper enterprise had forced the administration of one of our largest municipalities to consider the condition of its fire alarm telegraph, a telephone expert rather than a fire alarm superintendent was employed to examine and report upon its condition.

"Some of you will remember that the papers attempted to convey the impression that the system referred to was entirely unreliable. The underwriters showed their anxiety. The conditions were known to some of us as one inviting criticism, mainly because it had not kept pace with the improvements in machinery and methods which marked progress in other places, but from men of experience and practical knowledge no such universal condemnation would have been applied to a department doing its duty so faithfully that the chief engineer gave it his confidence, while asking for such improvements as appealed to him for the good of the service.

"This one instance is perhaps sufficient to inspire the members of this convention with a sense of their importance as representatives of a leading element in the arrangements providing for the comfort and protection of the communities depending on their enterprise to secure the best conduct in the introduction and distribution of electricity for the many uses required, and as individuals you have demonstrated your fitness for the duties of your stations, make it your ambition to advance still further in the confidence of those employing you by helping to elevate this association to its proper position among the technical organizations of the day.

"You have succeeded in what you have undertaken along one line, and this success should be all the encouragement needed for a broader field of labor. Do not rest content with the conclusion that many of the phases of the electrical problem do not immediately affect the care and improvement of your equipment, for we do not know when some feature of its operation and development may have an important relation to the safety of our plant. More than this, the prominence your position imposes should impress a desire in you to be among those who are the recognized leaders in the field."

The report was referred to a committee for recommendations as to the best methods to pursue in carrying out the suggestions of the president. Messrs. H. C. Bundy, C. R. George and R. A. Smith were appointed as such committee.

Mr. C. S. Downs then offered the following resolution, which was fully discussed before adoption:

"Whereas, One of the purposes of the International Association of Municipal Electricians is the protection of the lives and property of the people whom we represent, from electrical hazards, and

"Whereas, Alarming destruction of life and property has resulted from high voltages on alternating current secondary systems by reason of the failure of the insulation between the primary and secondary circuits of such systems, and

"Whereas, The existence of the said high voltages may be prevented by properly grounding the alternating current secondary systems; now therefore, be it

"Resolved, That the International Association of Municipal Electricians, deliberating as an international body, urges and demands the enactment of proper legislation requiring the grounding of all alternating current secondary systems, when by so doing the voltage between the earth and any part of the said secondary system will not exceed 250 volts, and this body pledges the support and advocacy by its members of all legislative measures to that end."

The second day's proceedings began with the reading and discussion of the report of the inspection department upon "The National Electrical Code: Its Proper Interpretation and Bearing on Fire-Alarm and Police Signal Work." The subjects embraced in the report were discussed at some length by Messrs. Grant, of New Haven; Farrand, of Atlantic City; George, of Houston, Tex.; Murphy, of Cleveland; Thompson, of Richmond, Va.; O'Hearn, of Cambridge, Mass.;

Smith, of Norfolk, Va., and others. The result of the discussion was that a committee of three, consisting of W. H. Thompson, of Richmond, Va.; R. A. Smith, of Norfolk, Va., and A. C. Farrand, of Atlantic City, was reappointed to attend the meetings of the electrical committee of the National Board of Fire Underwriters.

Mr. S. W. Manning, as chairman of the committee on Fire-Alarm Telegraphs, read a paper on "The Progress of the Fire-Alarm Telegraph." This paper was printed in full in our previous issue.

Mr. H. C. Bundy, of Watertown, N. Y., in discussing the paper at some length, said that the telephone fire-alarm calls were unsatisfactory.

Mr. Jerry Murphy, of Cleveland, explained how telephone fire calls were handled in his city. Many others took part in the discussion of this important and growing method of reporting fires, and it was the opinion of many that the association should devise some uniform means of utilizing telephones for reporting fires and not depend upon the haphazard methods in vogue to-day. It was thought that the telephone companies would gladly co-operate with the association in the endeavor to solve this problem. At the present time no two telephone companies pursue the same method of permitting their clients to report fires to the department. The entire morning session was devoted to a discussion of this subject. Immediately before adjournment Mr. G. W. Dietz, manager of the Western Union Telegraph Company at Atlantic City, announced that his company had extended the free use of its facilities to the members of the association.

At the afternoon session of the second day's proceedings Mr. Julius Bernstein, of Philadelphia, read a paper on "An Improved Method of Testing for Faults on Fire-Alarm Circuits."

Mr. Jerry Murphy, of Cleveland, read Mr. A. C. Farrand's paper on "An Instrument for Locating Faults in Fire and Police Telegraph Circuits Without Opening the Line." After some discussion of this paper the association by unanimous vote decided to recognize this method as the Farrand Method of Testing.

Mr. W. S. Devlin then read his paper on "Underground Construction," which was printed in full in our September 16 issue. A majority of those present gave their experiences in underground construction work, which enabled comparisons to be made and which would facilitate the selection of the best possible underground system.

The third day's session began with the reading of a paper on "The Storage Battery," by James Dixon, of Boonton, N. J. The discussion of this paper was quite general, the members giving their experiences in handling storage batteries. Comparisons of sizes were made and much valuable information on this subject was obtained through the discussion that ensued. The entire morning session was devoted to a consideration of this interesting paper.

President Yeakle read letters from W. M. Petty, Frank C. Mason and others regretting their inability to be present.

At the afternoon session Mr. Julius Bernstein further explained the Farrand method of testing, making comparisons with the Wheatstone bridge principle and other methods, illustrating by diagrams the various well-known methods of testing for faults. Officers for the ensuing year were then elected as follows: President, J. B. Yeakle, of Baltimore; first vice-president, J. S. Craig, of Toronto; second vice-president, A. L. W. Kittridge, of New Haven; third vice-president, A. J. Bell, of New Rochelle, N. Y.; fourth vice-president, C. S. McCosker, of Mobile, Ala.; secretary, Frank P. Foster, of Corning, N. Y.; treasurer, C. E. Diehl, of Harrisburg, Pa.; executive committee, S. W. Manning, of St. Paul, Minn.; H. G. Kennedy, of Rochester, N. Y.; S. L. Kingsbury, of Baltimore; O. M. Schaffer, of Trenton, N. J.; A. S. Pierce, of Wallingford, Conn.; J. C. Simpson, of Washington, D. C.; Clarence R. George, of Houston, Tex.; C. S. Downs, of Altoona, Pa.; J. W. Kelly, Jr., of Camden, N. J.

Finance Committee: T. C. O'Hearn, of Cambridge, Mass.; Jerry Murphy, of Cleveland, O.; C. F. Gall, of Louisville, Ky.

Committee on Electrical Inspection: L. L. Kingsbury, of Baltimore; C. S. Downs, of Altoona, Pa.; C. S. McCosker, of Mobile, Ala.

Committee on Police Signals: A. L. W. Kittridge, of New Haven, Conn.; S. W. Manning, of St. Paul, Minn.; C. E. Diehl, of Harrisburg, Pa.

Committee on Fire Alarms: J. C. Simpson, of Washington, D. C.; J. W. Kelly, Jr., of Camden, N. J.; H. G. Kennedy, of Rochester, N. Y.

Electric Light Committee: A. L. Pierce, of Wallingford, Conn.; C. S. Downs, of Altoona, Pa.; C. S. McCosker, of Mobile, Ala.

Committee on Outside Construction: O. M. Schaffer, of Trenton, N. J.; C. R. George, of Houston, Tex.; J. S. Craig, of Toronto.

Rochester, N. Y., was selected as the next place of meeting, the time to be decided upon later by the executive committee.

The committee on exhibits reported the following as a complete list of those who displayed exhibits or had representatives present:

Gamewell Fire-Alarm Telegraph Company, of New York; Kirnan Fire-Alarm Telegraph Company, of New York; Queen and Company, Philadelphia; Leeds and Northrup, Philadelphia; Westinghouse Storage Battery Company, Boonton, N. J.; Walker Electric Company; Frederick Pearce Company, New York; Sprague Electric Company, New York; Okonite Company, New York; Atlantic Electric Sign Company; Safety Insulated Wire and Cable Company, New York; Duplex Metals Company, New York; National Dictograph Company, New York; Kerite Insulated Wire and Cable Company, New York; Star Electric Company of Binghamton, N. Y.; National India Rubber Company, Bristol, R. I.

The entertainment provided for the visitors was extensive and of great enough variety to satisfy the desires of anyone. The hour from 12 to 1 each day was set aside as bathing hour, thus giving everyone an opportunity to enjoy the excellent bathing to be found at this popular resort. Tuesday afternoon when the business session had adjourned the visitors were entertained by rolling chair rides along the boardwalk. In the evening the various attractions to be found along this popular thoroughfare were visited, the badges admitting the wearers to all piers and places of amusement.

Wednesday morning the ladies of the party were entertained by Mr. George B. Gale, who took them for a sail on his yacht, "Princess Cobb," returning at 12 o'clock for the official photograph. Wednesday evening was spent on Young's Million Dollar Pier, where those who were so inclined, enjoyed dancing in one of the finest ball rooms in the world.

Thursday morning was spent by the ladies in visiting the shops of Atlantic City and procuring souvenirs of the occasion. At the close of the last business session the whole party took a trolley ride to the Inlet and partook of a shore dinner at Bates' Inlet Hotel, which was given by the Gamewell Fire Alarm Telegraph Company of New York. The entertainment committee is to be congratulated upon the success of these features of the gathering, all of which were carried out to the entire satisfaction and enjoyment of those concerned.

Among those in attendance were:

Albany, N. Y.—J. J. Gillespie.
Allentown, Pa.—Peter J. Beisel.
Altoona, Pa.—C. S. Downs and wife.
Atlantic City, N. J.—W. L. Crook, A. C. Farrand and wife, J. W. Garey and wife, E. E. Ingalls and wife, E. M. Plummer and wife, D. B. Scarborough and Horace Turner.
Baltimore, Md.—Lester Kingsbury and wife and J. B. Yeakle, wife and daughter.
Bayonne, N. J.—R. Arbuckle, wife and son.
Boonton, N. J.—James Dixon.
Bridgeport, Conn.—F. O. Snow.
Bristol, Pa.—Frank T. Chambers.
Bristol, R. I.—P. F. Lyons.
Cambridge, Mass.—Timothy C. O'Hearn.
Camden, N. J.—John W. Kelly, Jr.
Charleston, S. C.—Ion Simmons.
Chicago, Ill.—Frank F. Stover, H. D. Fargo and H. B. McMeal.
Cleveland, O.—Jerry Murphy.
Corning, N. Y.—Frank P. Foster and wife and John W. McCarthy.
Detroit, Mich.—Louis Gascoigne.
Elizabeth, N. J.—M. L. Van Houten.
Elmira, N. Y.—Will Y. Ellett and wife.
Erie, Pa.—Wm. Crane.
Harrisburg, Pa.—C. E. Diehl, wife and daughter.
Houston, Tex.—Clarence R. George and wife.
Louisville, Ky.—C. F. Gall and P. G. Kern.
Meadville, Pa.—A. J. Balizet.
Minneapolis, Minn.—Z. F. Morrison.
Mobile, Ala.—C. S. McCosker.
Morristown, N. J.—Frank E. Pierson and wife.
Mount Vernon, N. Y.—W. H. Flandreau.
Newcastle, Pa.—Wm. S. Devlin.
New Haven, Conn.—James Grant and wife.
New Rochelle, N. Y.—A. J. Bell and wife.
Newark, N. J.—Adam Bosch, wife and daughter.
New York—E. C. Chamberlain, Albert H. Cross, A. P. Eckert, J. A. Herr, C. C. Johnson, Jas. F. Kinder, Romaine Mace, H. G. Madden, T. S. Mahoney, George T. Manson, Joseph Maxwell, P. W. Miller, W. J. Mundell, Frederick Pearce and wife, C. W. Price, Harry E. Reid, Richard C. Smith, V. Stanley, J. B. Taltavall, wife and daughter, and G. L. Wiley.
Norfolk, Va.—R. A. Smith and L. R. Willis.
Ottawa, Can.—Miss Garfoot and G. F. Macdonald.
Peoria, Ill.—W. E. Wolgambtt.
Philadelphia, Pa.—D. W. Hall, T. E. Hughes, Chas. S. Redding and Julius Bernstein.
Pittsburg, Pa.—Elmer Loomis, G. L. Ross and J. M. Spader.
Reading, Pa.—W. C. Matthias.
Richmond, Va.—W. H. Thompson and son.
Rochester, N. Y.—H. G. Kennedy and Jos. B. Smith.
Scranton, Pa.—W. J. Neave and wife.
St. Louis, Mo.—Robert Crane.
St. Paul, Minn.—Stanley W. Manning and wife.
Syracuse, N. Y.—M. J. Myers.
Toledo, O.—Mark Winchester and wife.
Toronto, Ont.—John S. Craig and wife.
Trenton, N. J.—O. M. Shaffer and wife.
Wallingford, Conn.—A. L. Pierce and wife.
Washington, D. C.—James Simpson and wife.
Watertown, N. Y.—H. C. Bundy.
York, Pa.—Warren E. Fastnacht.

The Storage Battery in Its Relation to Signaling Systems.*

BY JAMES DIXON, BOONTON, N. J.

For any signaling system, and particularly for such systems as comprise closed circuit operation, the lead-lead type of storage battery possesses certain great advantages over primary battery. Chief among these advantages are:

1. Minimum of attention in use.
2. Low cost of maintenance.
3. Long life of parts.
4. High voltage per cell.
5. Large energy capacity in small space.
6. Uniform discharge voltage.

On account of these points in favor of the storage cell, the installation of primary battery is

* A paper presented at the annual convention of the International Association of Municipal Electricians at Atlantic City, N. J., September 14-16, 1909.

seldom considered except where suitable charging current is not obtainable.

The storage battery is now generally used in large fire alarm and police telegraph systems, railway signal systems, common battery telephone plants, large telegraph offices, and even for the bell circuits of buildings, in preference to the primary battery.

A storge battery cell must be considered as made up of three chief parts, namely, the positive element, the negative element and the container, with the electrolyte.

All of these must be suited to the particular functions which they perform.

POSITIVE PLATE.

The positive plate, the active material of which is peroxide of lead, should be of the Plante or electro chemically formed type for all signal service, as this is the most durable type of plate.

To avoid buckling the lead must be given space to increase in bulk without restraint, as it forms into oxide in use.

The plate must be designed so as to afford the best possible support for the oxide. The oxide must be in thin layers with good circulation of electrolyte. This reduces the liability of injurious sulphating and improves the discharge voltage.

Positive plates wear out by the gradual oxidation of the reserve lead and, as it is obvious that thick lead will be used up slower than thin lead, the positive plate containing the thickest reserve lead may reasonably be expected to give the longest life, other things being equal, and this is found to be true in practice.

A pasted positive, which has no reserve lead at all, has a comparatively short life. The durability of positive plates is a most important matter and in general the battery with the best positive is the battery to be relied upon, as good positives are much more difficult to make than good negatives.

NEGATIVE PLATE.

The negative plate should also be of the Plante type, for the purpose of durability. A Plante negative which has been heavily sulphated by over discharge or neglect can be brought back to healthy condition quite easily, whereas a pasted negative, once sulphated, is permanently injured and cannot be restored.

The active material of the negative plate is sponge lead and is not subject to deterioration, but circulation of electricity is necessary and important.

CONTAINING VESSEL.

In all small stationary cells the glass jar is to be preferred as a container on account of low cost and ease of inspection, as well as for insulating qualities.

The jars should be so deep that cleaning out of sediment during the life of the positive plates is unnecessary.

Each cell should be provided with a cover to prevent spraying out of electrolyte during charge and to reduce evaporation.

While various methods of mounting the cells in battery are in use it is generally agreed that the leakage path between adjacent cells should be made as long as possible.

ELECTROLYTE.

Pure electrolyte, made of "brimstone acid" and distilled water, should be used wherever possible.

The most injurious impurities are iron chloride and nitrogen salts, and these often occur in city water to such a degree as to greatly shorten the life of the plates, if such water is used in making the electrolyte.

TYPES OF CELLS.

Two general types of battery are in common use.

The "couple" type, so called because the cell contains but two plates, is popular because of low first cost and small space occupied.

The absence of bolted connections is accomplished by "lead-burning" the connecting straps together, the positive strap of one cell being burned to the negative strap of the next cell and the "U" shaped element thus formed is suspended over the edges of the jars.

The disadvantages of this type are:

1. When either plate is worn out the complete element must be renewed, as the cost of burning on new plates is generally prohibitive.
2. The jars must be placed quite close together, reducing insulation.
3. The leakage path around jar edge, from positive to negative, is short.

The "multiple" type of cell contains three or more plates.

The negative element usually has one more plate than the positive.

The reason for this is that when standing in a charged condition the negative element is the one that loses its charge by local action most rapidly. Hence excess of negative capacity is desirable, to enable the whole discharge of the positive element into the working circuit.

In a multiple cell the positive and negative plates are burned into "groups" on suitable connecting straps and suspended in the jar by lugs formed on the plates or straps. Separation between the plates is maintained by glass or rubber rods, corrugated rubber sheets, wood diaphragms or other suitable means.

The terminals of multiple cells assembled in battery are usually bolted together with lead covered bolts, although it is now becoming quite common to burn these connections and dispense with bolts. This is particularly true in telephone batteries and in moderate sized power batteries.

The disadvantages of a "multiple" cell as compared to a "couple" cell of equal capacity rating are:

1. Greater first cost.
2. Greater room required.

SIZE OF CELLS FOR ANY GIVEN DUTY.

The work to be done, expressed in ampere hours, determines the smallest size of battery for

any particular case. Other considerations may make the use of a much larger battery advisable.

The number of hours during which current must be provided in case of break down of charging facilities must be given due thought.

Furthermore, in operating a battery, the lead in the positive plates is being continuously oxidized and to get electrical energy out of a battery lead is used up, just as truly as coal is used up when it is burned to get out of it the heat energy dormant in it.

Therefore, if the smallest battery possible be selected, it may not be actually the cheapest, as a battery of double the capacity will probably cost only fifty per cent. more, with an increase in useful life of about one hundred per cent.

It may often be readily proved by calculation that a battery of several times the needed capacity will be the cheapest in the long run.

The consideration of the members of this association is particularly asked for a special type of signal battery designed by the engineers of the Westinghouse Storage Battery Company, in collaboration with Mr. A. C. Farrand, chief electrician of Atlantic City.

CONSTRUCTION OF PLATE OF ATLANTIC CITY TYPE OF STORAGE BATTERY.

This is a multiple type cell containing three negatives and two positives.

The plates are both of the Plante type and the battery is made with either "Bijur" alloy frame plates or Westinghouse "integral" pine lead plates in two different sizes.

The positive may be considered as made up of vertical ribbons of pure lead, with horizontal cross members, in the form of a grill.

The surface so secured is very large and the oxide is in thin layers, grown from the ribbons by the usual plante-forming process, and supported in small holes or cells.

Each ribbon is given room to extend both lengthwise and crosswise, eliminating all buckling and growing.

In assembling the cell the positive is hung upon the negative by ring rubber separators and the negative alone touches the jar, entirely eliminating leakage between positive and negative in the same cell.

Connections between cells are bolted or burned as desired. By bending the straps the bolts are brought over the space between cells, and little corrosion is encountered in their use.

The jars are quite high and have sufficient space to allow the entire positive plate to turn to sediment before cleaning is required.

The covers are made of white opal glass, non-hygroscopic and non-absorbent, with completely lapped joints. Spraying and evaporation from these cells is reduced to a minimum.

For supporting the jars upon the shelves a glass or glazed porcelain tray is used. The tray has a small base, giving a maximum leakage path from jar to jar. As installed in battery the leakage path from the negative of one cell to the negative of the next cell is over twenty-four inches.

The capacities determined upon as standard; namely, twelve-ampere hour and fifteen-ampere hour, are equal respectively to twice and two and one-half times the capacity of the usual six-ampere hour couple. It is believed that the durability of these cells will exceed twelve years as compared with an average life of six years for the couple type.

Moreover, when the positive element is worn out new positives can be installed and the negative continued in use, thus materially reducing the cost of renewals.

THE NATIONAL ELECTRICAL CODE.*

Its Proper Interpretation, and Bearing on Fire Alarms and Police Signal Work.

BY R. A. SMITH, NORFOLK, VA.

The writer, although having had twelve year's experience in electrical inspection work, does not pretend to be able to properly interpret all rules embodied in the code, but wishes to bring out some of the prominent rules that are often misunderstood, and especially those bearing on Fire Alarm and Police Signal work.

Speaking first, of the Fire and Police Signal system, it is often the case, that Fire Alarm and Police Central Office wiring, is far from being what is required by the code, suitable fire proof racks and cabinets being conspicuous by their absence, high tension and sneak current protectors not being provided, and often only bell wire being used to carry heavy voltage circuits.

* Paper read at the annual convention of the International Association of Municipal Electricians at Atlantic City, September 14-16, 1909.

Battery stands and wiring thereto, constitute a great source of danger when long circuits are to be provided for, also when storage batteries are used and stands are connected to lighting mains for charging.

When it is understood that the National Electrical Code contains a rule, that requires all branch circuits connected to lighting circuits of 300 volts and less, to be installed with rubber covered, or slow burning insulated wire, not less than No. 14 B. & S. and mounted on insulated supports that give at least one-half inch separation between wire and surface wired over, and to be at least two and one-half inches apart, also to be bushed through wood work with approved tubes, it will be apparent to all of us, that, our battery circuits, from charging board to battery stand at least, should comply with this rule.

Battery racks are sometimes ignored in providing protection against possible short circuiting of battery wires between battery and switchboard, this is also a violation of the Code rule that requires proper fusing of all wires connected to a source of energy, whether dynamo or storage battery.

Current for charging purposes is often obtained from as high as 550-volt trolley circuits, and this and most lighting circuits being grounded on one side, always has a difference of potential between one side of the circuit and ground, equal to the full voltage of the line, this means heavy leaks to other circuits if not properly insulated, electrolysis of wires in damp places, and also a possible reversal of current in working circuits that may be run parallel.

Other requirements of the National Board of Fire Underwriters are, the proper distribution of circuits, not allowing more than twenty boxes to a circuit, avoiding placing both sides of the same circuit in one cable, fire proof buildings, records of tests and troubles, absolute non-interfering and successive movements in boxes, distances between boxes in congested districts to be so arranged that there will be a box within 600 feet of all buildings.

Maps are considered essential, full records of lengths of circuits, tests of liquid of storage batteries and ample ventilation for battery rooms.

These matters are of vital importance to the fire alarm and police superintendent, and by observing same he will be saved much embarrassment in case the national or local board of underwriters make him a call or give him a write up.

The proper observance and interpretation of other rules in the Code, relating to line work, and lighting in general, are of vast importance to the city electrician, and he will find constant study and application of the rules necessary, in order to keep abreast with the march of improvements, and necessary changes in rules.

There is much to be learned in attending the bi-annual meetings of the electrical committee, of the National Board of Fire Underwriters, held in New York. These meetings are open to all parties interested, and afford excellent means of finding out the true meaning of rules, as well as obtaining valuable information from inspectors from all parts of the country.

Fire Alarm and Police Telegraphs in the United States.

The bulletin issued recently by the United States Bureau of the Census, giving the statistics of the third census of the telegraph taken in 1907, give some interesting details covering the fire alarm and police telegraph systems of the country at the end of that year. There were at that time 1,157 systems in operation, using 70,812 miles of single wire, with 62,504 signaling stations, or boxes, giving 120,719 fire alarms. Of these 1,157 systems, 48 were used interchangeably for fire alarms and police patrol purposes, 931 for fire alarms solely, and 178 for police signaling only.

The 979 systems used for fire alarm signaling comprised 57,234 miles of wire of which 22,657 miles were underground. Electric fire alarm systems were in use in over ninety per cent. of the cities in the United States having a population of over 10,000.

The systems devoted entirely to electric fire alarm signaling had 35,337 miles of single wire, 40,897 boxes or signaling stations, and 2,143 special telephones. During 1907 such systems reported 96,516 fire alarms. The lines used interchangeably for the two purposes had 21,897 miles of single wire and received 24,203 fire alarms.

The mileage reported for police patrol signaling systems alone was 13,578, and the number of signaling stations was 8,694. The reports for 1907 show 41,961,650 police calls, of which 29,946,757 were telephone calls. Of the 38 cities with a population of 100,000 or over in 1900, 35 reported electric police patrol systems in 1907, while 33 of the 40 cities with from 50,000 to 100,000 inhabitants had such systems.

Municipal Electricians.

The Atlantic City convention was conceded to be the most largely attended as well as the most important gathering ever held by the International Association of Municipal Electricians.

Everyone was glad to welcome Mr. W. Y. Ellett, of Elmira, N. Y. Notwithstanding the fact that Mr. Ellett had met with a serious accident some time ago which confined him to his house for a number of weeks, by the aid of a crutch and a cane, he was able to attend the Atlantic City convention. It is to be hoped that he will soon be able to report to his friends his complete recovery.

The Chief Engineers' convention, which occurred recently at Grand Rapids, Mich., was a great success. Syracuse, N. Y., secured the next convention of this organization.

An Instrument for Locating Faults in Fire and Police Telegraph Circuits, Without Opening the Line.*

BY A. C. FARRAND, ATLANTIC CITY.

The necessity for having the best kind of fire and police alarm apparatus in every town or city, where an earnest effort is being made by the authorities to protect its citizens against fire loss, and to keep the efficiency of its police force the highest, cannot be disputed. A high grade system, if kept in proper repair, is almost sure to give satisfactory results. If, however, the system is not kept in repair, it is almost worse than useless, for it then becomes a false protection, probably failing or refusing to operate at some critical time. The system in which trouble never develops yet remains to be perfected, and it, therefore, behooves us, who are responsible for the operation of alarm circuits, to see to it that we are supplied with the best means for locating trouble, in order that it may be repaired with just as little delay as possible.

The location of faults in a line of uniform resistance, and in a line where the faulty wire may be taken out of service, is a comparatively simple matter. The problem which confronts us in alarm work, however, is not quite so simple. In the first place our circuits are not of uniform resistance, being made up of conductor resistances, box gong striker resistances, etc. In the second place, the use of the ordinary Murray and Varley loop test is dangerous, in that it necessitates the breaking of the circuit, and this breaking of the circuit, even for a very short time, may intercept an alarm, entailing a large property loss.

With these facts in mind, the writer has devised a method for quickly and accurately locating faults without breaking the circuit under test, or in any way interfering with its operation.

Before proceeding with a description of the instrument arranged for this test, it might be well for us to fix accurately in our minds just what it is that we are to do. A careful alarm superintendent sees that at regular intervals the circuits under his care are tested for grounds. A single ground on the circuit will not interfere with its operation, but allowing such a ground to remain renders the system liable to serious trouble, for a second ground may develop at any time. Therefore, an instrument for locating grounds is a necessity to a fire alarm superintendent.

The instrument now about to be described is one upon which grounds may be quickly located, without interfering with the operation of the line. In addition, with this instrument, ordinary resistance and Murray and Varley loop tests may be run.

*Read at the convention of the International Association of Municipal Electricians at Atlantic City, September 14-16, 1909.

The essential feature of the apparatus is the uniform resistance AB Figure 1, which lies in a circle, and has a resistance of 1000 ohms. By a special construction, it is so arranged that contact may be made at any point along it, and it is therefore equivalent to a very high resistance slide wire. It has a moving contact, C, and a uniform scale of 1,000 divisions. In series with this slide resistance is a resistance equal to it which may be short circuited by means of the switch U. The galvanometer is so connected, that by a simple change of switches, it may be connected either for resistance measurements for Murray or Varley tests, or for the test now under consideration, which we will call the Farrand loop test. A small switch is also provided to cut out the battery contained in the set, as

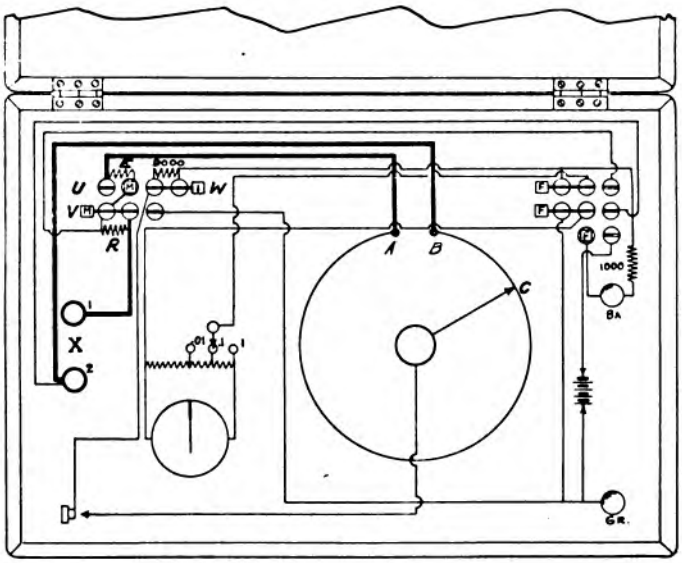


Fig. 1

in the Farrand loop test no battery is used other than that employed in the alarm circuit. As shown in Figure 1, other switches are provided so that the instrument may be quickly set for any of the tests of which it is capable. The various connections can be readily traced out from Figure 1.

Ground locations may be made with this instrument as follows:

The switchboard ground detector will tell upon which side of the circuit the ground is located. The bad side of the line should be connected to the post X_2 of the instrument, and the good side to X_1. These connections are taken from the point where the circuits leave the office, thus eliminating the resistance inside the office. Inasmuch as current is constantly flowing through the circuit, we have a difference of potential between the two points which we have connected to the instrument. This serves as our test electro-motive force. Set the switches on the right hand side of the instrument so that the letter F is exposed. Switch U should be opened,

and switches V and W closed. Connect post Gr to ground. The connections as they now stand are shown in simplified form in Figure 2.

An inspection of Figure 2 will show that we now have an ordinary Wheatstone Bridge arrangement in which one part of the slide resistance forms one arm, the remainder of the slide resistance, plus the 1,000 ohms, forms another arm, the length of conductor from the station to the fault a third arm, and the remainder of the conductor, the fourth arm. The galvanometer connection is made through the ground.

By turning the pointer over the dial, a balance of the galvanometer may be procured. Inability to bring the needle to rest indicates stray earth currents. A shunt is provided, so that the sensibility of the galvanometer may be decreased, thus decreasing materially the effect of stray currents.

Having procured a galvanometer balance, the resistance to the fault may be found by multiplying the scale reading by one half the total resistance of the circuit, and dividing the product by 1,000.

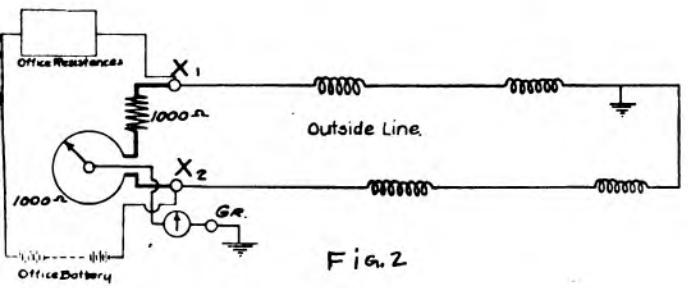


Fig. 2

To locate the fault, it will be now necessary to add up the resistances (both instrument and conductor), along the line until a value is obtained which agrees with the value obtained from the determination described.

The following example will illustrate the method:

Galvanometer balance obtained with pointer at 492. One half resistance of circuit = 55 ohms.

Resistance to fault $= \frac{492 \times 55}{1000} = 27$ ohms.

Starting from office, circuit passes through conductor having 5 ohms resistance, an instrument having 10 ohms resistance, a conductor having 5 ohms resistance, and an instrument having 5 ohms resistance. This gives a total of 25 ohms. The next conductor resistance is 5 ohms, therefore the fault will be $\frac{27-25}{5} = \frac{2}{5}$ of the distance along the conductor.

This method has been given in order that an understanding might be had of the operation of the instrument. A method of use is now about to be given which is recommended for actual use because of the quickness and ease with which grounds may be located. Some preparatory work is necessary, as will be explained, but it will be readily seen that this work will well pay for itself.

The instrument is connected across a circuit as before, and a man is sent out along the line, grounding each side of each resistance, and each box. As each ground is made, the instrument is balanced, and the reading noted. A diagram of the circuit may now be made, showing the instrument reading for each ground. This should be done for each circuit. Such a diagram is illustrated in Figure 3.

It will be noted that the readings start from either end of the circuit. Starting with one end of the line, the dial readings will increase until one half the resistance of the line has been gone over. It will then be necessary to reverse the connections to the instrument to procure a galvanometer balance.

Having prepared such a diagram for each circuit, assume that a fault has developed in one of the circuits. To locate the fault, it is simply necessary to connect in the instrument, and balance the galvanometer. Noting the dial reading, and which side of the circuit is connected to X_2, the location of the fault may be seen upon the diagram.

The following examples will illustrate the method:

First. Balance obtained with pointer at 540, with wire 2 connected to post X_2. It will be easily seen then, that the ground is somewhere in the resistance R_4.

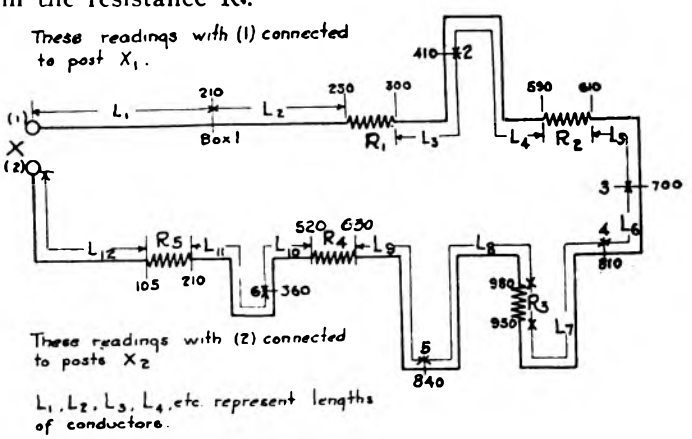


Fig. 3

Second. Balance obtained with pointer at 320, and wire 1 connected to post X_2. It will be seen from the diagram, that the ground is somewhere between resistance R_1 and box 2. The actual location may be determined by dividing the difference between the reading just obtained, and the value noted on the right of resistance R_1, by the difference between the value noted at box 2, and the value noted at the right of R_1 and multiplying by the length of the conductor between R_1 and box 2. Therefore the fault thus located would be a distance d from R_1, equal to 102.7 feet, found as follows:

Let $L_s = 560$ feet.

$$d = \frac{320-300}{410-300} \times 560 = \frac{2}{11} \times 560 = 102.7 \text{ feet.}$$

These directions for using this test will show how simple its operation is. After the diagrams have been prepared, it is a matter of but a very few moments to locate a fault.

Grounds, however, are not the only sources of trouble which must be guarded against. An increase in resistance in the line, due to dirty or corroded shunts, bad connections, etc., may, if not corrected, result in an open circuit.

The normal resistance of each circuit should, of course, be known. For all practical purposes this may be determined closely enough from the switchboard instruments. When these instruments indicate an increase of resistance of say twenty or twenty-five ohms, it is an indication of trouble. The resistance as obtained from the switchboard includes the instruments in the office, but these may be kept under the superintendent's eye, and therefore in good condition, and the chances are that the trouble is on the line. To locate it, having the diagrams previously spoken of, it is only necessary to send a man out along the line again, grounding the different points as before. When a point is reached where the new dial reading is noticeably larger than the original reading, the trouble has been reached, and may be quickly located.

For several months I have had this instrument in actual use, and have found it to be thoroughly satisfactory. Its operation is simple and quick and its results reliable.

As stated before, the most important feature in connection with this instrument, and the one which interests us most, is the fact that the instrument may be used without, in any way, affecting the connections and operation of the various circuits.

Cause of Earth's Magnetism.

The following letter, which is taken from the St. Louis Republic, and is self explanatory, may be of interest at the present time, although the "magnetic pole" has been nearly forgotten amid the discussion about the North Pole:

To the Editor of The Republic.

In an editorial on the 9th inst., you refer to the alleged discovery of the law of the magnetic pole, by Mr. Naulty, of New York, who also advances a theory of the cause of the earth's magnetism.

I inclose an article written by me and published in Telegraph Age, of New York, April 1, 1905, from which it will be seen that Mr. Naulty was anticipated more than four years in the publication of this theory.

The alleged "law" governing the exact location of the magnetic pole, however, is easily shown to be erroneous. If such a law obtained, the magnetic pole would show wide variations in position, whereas, it is definitely known that, while it may shift its position slightly, it is practically stable in location.

D. B. Grandy.

St. Louis, September 11, 1909.

Telegraph Age, April 1, 1905.

That the earth is an immense magnet, with poles coinciding, approximately, with its axis of rotation, is generally accepted as true; but no adequate explanation of the fact has been advanced with sufficient weight of authority to command general acceptance.

Reasoning by analogy from known facts, however, points to an explanation which, to the mind of the layman at least, appears plausible. It is known that if a number of plates of certain metals are laid, alternately, one upon another, and the top and bottom plates connected by a wire, heat applied to the pile will develop an electric current through the plates and the connecting wire. This is called a "thermopile." There is reason to believe that different strata of air at different temperatures, in the upper regions of the earth's atmosphere, acted on by the rays of the sun, develop electric currents in a manner analogous to the action of the thermopile, although the efforts of the experimenters on Pike's Peak to tap these upper currents was a pronounced failure.

Now, if a few small pieces of metal, by the application of a few degrees of heat, will develop a current of even a fraction of a volt, is it not reasonable to suppose that the heat of the sun, beating fiercely and continuously upon half the earth's surface, as it rotates, would develop thermo-electric currents of inconceivable volume and potential in the earth's crust and possibly in its atmosphere? These currents would flow around the earth, in a direction parallel with the plane of the sun's influence, or, taking the entire year, generally parallel with the equator. If, among the substances supposed to exist in a state of fusion in the earth's interior, there is a considerable proportion of the magnetic metals, iron ,nickel, cobalt, etc., these currents flowing around them would create a magnetic condition in the earth's mass, with poles at right angles to the direction of the current flow, and to the plane of the sun's influence, and the resultant magnetic poles would be in the vicinity of the true geographical poles.

On this hypothesis the magnetic poles should shift their positions, gradually, as the earth changes its relative position to the sun. That this is not the case has not, I imagine, been positively proven. It is conceivable that what has been considered the north magnetic pole, located in the region north of Hudson's Bay, may be but the outcropping near the surface of vast beds of iron, which, being in a state of permanent magnetization, overbalances by the strength of its magnetism, all other points in the magnetic polar region precisely as if a number of magnets are placed in a circle and one of them is of paramount strength and attractive power, all needles in the vicinity of the circle of magnets would be attracted toward the magnet of great power.

It seems to me that the theory here advanced is in no way at variance with known facts, and that it presents a reasonable explanation of the phenomena of terrestrial magnetism.

American District Telegraph Company Enters the Municipal Fire Alarm Field.

The American District Telegraph Company in connection with its extensive Fire Alarm and Messenger Service has recently entered the Municipal Fire Alarm and Police Telegraph field with a complete line of high grade apparatus. To accomplish this the company has taken over the plant of the Star Electric Company, located at Binghamton, N. Y. The Star Electric Company's apparatus has been on the market for a number of years and extensive installations have been made in a number of cities.. The central office equipment at Cleveland, O., and Albany, N. Y., being especially illustrated in this article. The apparatus of the Star Electric Company has stood the test of long use and is giving perfect

ENGINE HOUSE GONG, STYLE M.

satisfaction in the cities where installed. It is the intention of the American District Telegraph Company to largely increase the plant in order that it may meet the demands for this kind of apparatus, and be foremost in fulfilling the needs of municipal telegraph service. The American District Telegraph Company is the largest and strongest concern in the world handling municipal fire alarm apparatus, and it goes without saying that the company lacks nothing in the way of technical ability and financial strength to produce systems of the highest possible excellence.

The company has exceptional facilities for putting these goods on the market at the lowest sales cost, and on account of it extensive organization having as it has experts in almost every community, is able to furnish valuable assistance in any emergency and constantly co-operate in maintaining the service of its customers at its highest efficiency.

The Star Electric Company's apparatus is distinctive and excells other types of apparatus in the following particulars:

METROPOLITAN BOX FOR CITIZENS' KEY.

Placing in the reach of citizens the means of quickly and surely giving accurate and unmistakable notice to the fire department of the existence and location of any fire.

Protecting a citizen from exposure to being killed or maimed by electric shock in sending an alarm of fire even if the fire alarm cricuit has become charged from a deadly high voltage line.

Giving as nearly as possible uninterrupted service regardless of exposure to lightning or excessive current or voltage which may result from the line wires becoming "crcssed" with electric light or power circuits.

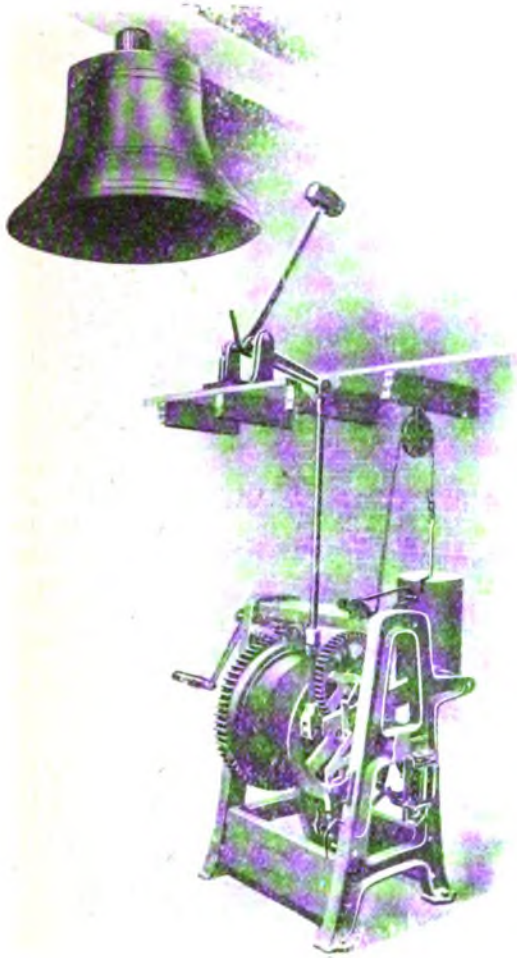
The accompanying cuts show some of the types of Star apparatus, although no attempt is made

METROPOLITAN BOX WITH LOCAL ALARM DOOR.

to show the complete line as they build instruments of a large number of types to meet the conditions met with in the various municipalities.

Their line of fire alarm boxes possess a number of distinctive advantages the various types of which embody every known result in the way

of "non-interference," while the simplicity and positive action of their engine house central office equipments place them in a class by themselves. Their large city systems provide means for receiving many simultaneous alarms while repeating mechanism is provided so that the signal will be sounded in every engine house the moment a street box is started, giving the man



TOWER BELL STRIKER.

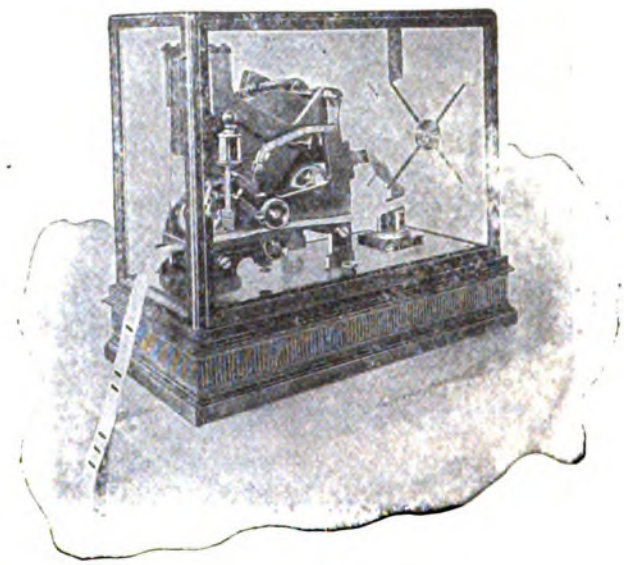
"on watch" in each engine house warning as to what box is to be sounded, so that for night fires only those companies responding to that particular call need be awakened, as the men on watch in the houses can cut out their gongs during the striking of an alarm on the gong and indicator lines. In cities where there are a large number of night alarms this is a great advantage, as it prevents breaking the sleep of any firemen except those actually needed, and keeps the remainder of the companies fresh for a later alarm. The Star central office equipment recently installed at Albany, N. Y., has received specially favorable mention on account of the efficiency of its constant gong circuit test, the special feature of storage battery controlled switchboards, the improved choke coil arresters and the high class of the wiring and the general workmanship of the installation.

This office is equipped with a very complete and up-to-date set of instruments for receiving, indicating, sounding, recording and sending out fire alarms; the various parts being so related to each other as to provide at least two, and in some instances five, alternative methods of accomplishing every important result.

When a street box is set in motion by a citizen, its number is recorded automatically on a paper tape, and while this record is being made a bell sounds the box number, and an incandescent lamp on the switchboard indicates the number by a red flash for each stroke of the signal.

The number of the box from which the alarm is sent is repeated at least four times in this way, and provision is made on the switchboard so that, as soon as the number has been repeated once to warn the operator on duty, he can, by moving a single switch, bring the box circuit from which the alarm is coming into communication with all the fire houses, so that the box number is automatically transmitted from the street box to suitable registers and small gongs in all the fire department houses.

A "Joker Transmitter" is provided for repeating the alarm from any of the box circuits to all the "joker" or indicator circuits. This transmitter is



INDICATOR REGISTER.

capable of being manually set to send any box number from 1 to 9999. It is used for taking care of alarms and special calls received by telephone, also in case the box circuit wires are partially disabled, so that the signal, as received, is not clear enough and might be misunderstood by the firemen on duty at the various houses, when it is verified by the operator from a list of numbers immediately above the red light for each circuit on the box circuit switchboard.

Each of the twenty box circuits is provided with a set of relays, switches, spring jacks, box lists, and tap bell, the bells of various circuits being tuned for different notes, so as to facilitate counting the signal from any one circuit if alarms should be striking on several circuits at once.

A large two-dial manual transmitter stands in the center of the room, each of its dials built of five plates, and so arranged that it can be set for any signal from 1 to 9999; or, by using the ten stroke position, any signal to 10,999 can be sent from either dial, besides various combination signals made up partly on one dial and partly on the other. These transmitters are so built as to admit of unusually quick setting.

The manual transmitter may be set to run "fast" or "slow," and may be connected to either the joker or gong circuits, being ordinarily set for slow speed and connected to the gong circuits so as to sound the large gongs in the steamer and truck houses, as well as the big bells in the City Hall tower and various church steeples used to sound public alarm.

The transmitters are operated by heavy cast-iron weights, electric motors being arranged to keep them automatically wound up, but a hand wind is also provided for use in the event of failure of the electric light current to operate the motor. After the manual-transmitter has been set in motion it will automatically stop itself and restore all the signal levers to their normal position provided a little knob has been set to "restore;" otherwise the signal set up will not be disturbed when the machine stops, so as to be ready for use in connection with any special call which may be received.

Automatic registers are conveniently mounted on each side of the manual transmitter, which record all incoming alarms by heavy ink marks on a wide paper tape, convenient for the use of the operator when sending out alarms; and another register records outgoing signals.

The transmitters and registers are mounted on highly finished solid mahogany stands with red marble base boards, and the mechanism of the transmitters is enclosed in polished and beveled plate glass cases, with carved mahogany posts.

The switchboards for the gong and joker circuits are provided with instruments for indicating each stroke of every signal as it is sent out on each circuit by means of targets and colored lights. A break in any of these lines is instantly shown and an alarm bell is sounded to direct the attention of the operator to any such defect in the outside lines. Telegraph keys are provided for each gong and joker circuit, also master keys for all the gongs and for all the joker circuits, so that the signals may be transmitted on either individual circuits or all at once by pressing the various keys.

ALBANY FIRE ALARM INSTALLATION.

Storage switchboard along further wall; Joker and Gong switchboard at right end of room. Corner of Relay switchboard at extreme right of picture.

The Railroad.

The Louisville and Nashville Railroad Company, it is understood, is equipping several of its divisions with train-despatching circuits.

The Gulf, Colorado and Santa Fe Railroad, W. M. Knowd, superintendent of telegraph, has recently installed telephone train-despatching circuits between Temple, Tex., and Cleburne, and between Cleburne and Gainesville, Tex.

The Chesapeake and Ohio Railroad Company, under the direction of J. S. Stevens, superintendent of telegraph, Richmond, Va., is preparing an initial installation of three telephone train-despatching circuits.

Mr. J. W. Hudson, of Arkansas City, Kansas, has been advanced to the position of wire chief and manager of the general offices of the Santa Fe system, Topeka, Kansas. Mr. Hudson is regarded as an able and competent railroad manager and electrician.

The Seaboard Air Line began the despatching of trains by telephone on its division between Raleigh and Monroe, N. C., on September 4. The new system, which was installed under the supervision of Mr. W. F. Williams, superintendent of telegraph, is giving excellent satisfaction.

The printed proceedings of the twenty-eighth annual convention of the Association of Railway Telegraph Superintendents, which met in Detroit, June 23, 24 and 25, are now ready for distribution. Filling a book of 200 pages, they form a valuable addition to the railway telegraph superintendent's library, containing as they do all of the papers which were read at the convention and a complete record of the discussions which followed the reading of each. The work of compiling the proceedings has been carried out most efficiently under the supervision of Mr. P. W. Drew, of Chicago, secretary of the association.

The Atchison, Topeka and Santa Fe Railway has recently installed the telephone for train despatching between Chicago and Newton, Kansas, a distance of 659 miles. This equipment is but a small portion of what is being installed, it being the intention of the railway company to extend this service over its entire system. At the present time there are eighteen different divisions upon which the trains are despatched by telephone. In this way 380 stations are reached in a total distance of 1,925 miles. The work has been carried out under the supervision of Mr. C. H. Gaunt, superintendent of telegraph and assistant general manager of that system.

Mr. L. W. Storror, Pacific Coast representative of the Postal Telegraph-Cable Company, at San Francisco, in renewing his subscription to Telegraph Age, says: "I hardly know how we could keep in touch with the telegraph world were it not for the Age. Its instructive columns, its interesting reminiscences, its telegraphic and personal gossip, with its fraternal, and ofttimes paternal editorial utterances, should commend it to all of our craft."

High Efficiency Transmission Circuit for Telephone Train Despatching.

BY H. L. BURNS.

The use of the telephone for the handling of trains is by no means new. For several years a number of railroads have been using the ordinary local battery, bridged telephone for this purpose, the various stations being called by code ringing. This arrangement was found to serve very well for short lines with not very many stations. When the attempt was made to use this arrangement on longer lines with a larger number of stations, it was found that the transmission would be seriously impaired when one or more of the receivers were off the hook at the same time. This difficulty was very noticeable later on when selectors began to be used and the telephone was introduced upon the more important and busier roads.

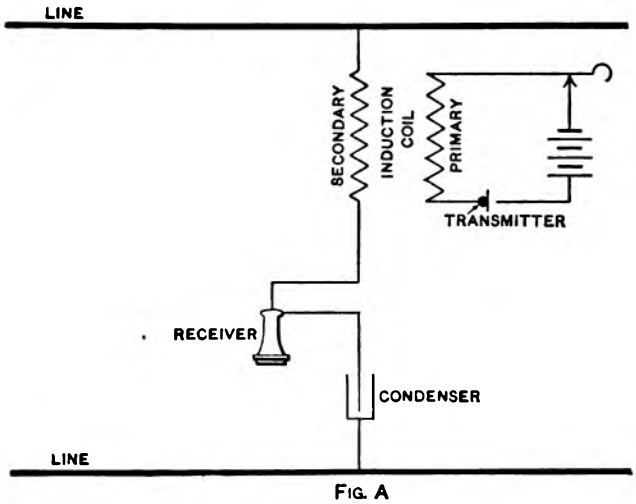


FIG. A

Figure "A" herewith shows diagrammatically the usual arrangement of a local battery telephone. Originally this arrrangement was used at both the despatchers' and way stations. From the sketch it will be seen that the bridge during conversation consists of a condenser, receiver and secondary of the induction coil in series. The total impedance of this bridge to talking currents is approximately 600 ohms, about 300 ohms of which are in the receiver and therefore active for receiving purposes. It is obvious that when a number of these sets are bridged across the line at once, the joint impedance of the bridges in parallel is very low and the transmission correspondingly difficult between terminals or widely separated stations.

An improvement on this arrangement so far as transmission is concerned was effected by using a larger induction coil having a low impedance primary and a high impedance secondary. The larger coil improved the outgoing transmission considerably, but this arrangement is not so efficient for receiving so that the gain resulting was not great.

To meet conditions imposed by this class of service, the Western Electric Company has devised the circuit shown diagramatically in Figure "B." The despatcher's equipment is substantially the same as shown in Figure "A" except that special apparatus is used. In order to provide the despatcher with the best possible receiving he is provided with instruments of fairly low impedance. A head receiver is used and is in series with the induction coil; the latter is specially designed to give the best possible transmitting consistent with good receiving. A locking transmitter key is provided inasmuch as the despatcher will ordinarily require both hands for his work. The transmitter itself is of the chest type and is special for this purpose.

It will be noted that the way station circuit is radically different from that shown in Figure "A." In order that a number of stations may be listening at once without serious detriment to the transmission, it is apparent that each must constitute, when listening takes place, a bridge of very high impedance. Further, in order to give efficient receiving, a large proportion of this impedance must be in the receiver itself. This precludes the possibility of having the receiver in series with the induction coil, because when transmitting, all the secondary talking current passes through the receiver. The high impedance of the receiver would cut down the transmitted current and in addition to this there would be the serious objection of excessive side tone.

A study of these conditions led to the conclusion that the use of a push button or key which in its normal position gives the best possible receiving conditions, and in its operated position gives the best possible transmitting, would be advisable. By referring to Figure "B" it will be noted that normally, i. e., in the listening condition, there is a current through the receiver and condenser in series directly across the line. When the key is thrown to the talking position it is seen that the receiver in series with a retardation coil (normally short circuited), is put in parallel with the secondary of the induction coil and these bridged across the line through the condenser.

When the key is normal the receiver is directly across the line through a condenser which gives the best possible receiving conditions. The receiver is specially wound and the impedance of the bridge at this time is about 2,400 ohms to talking current, practically all of which is in the receiver and consequently active for receiving. When the key is operated, the induction coil being bridged directly across the line through the condenser gives the best possible condition for transmitting. The function of the retardation coil is to prevent excessive side tone in the receiver when talking, also by raising the impedance of the receiver circuit, more of the transmission is forced upon the line. This retardation coil is so designed that in case the despatcher wishes to break in, a sufficient volume of the despatcher's voice currents will pass through the receiver to attract the operator's attention.

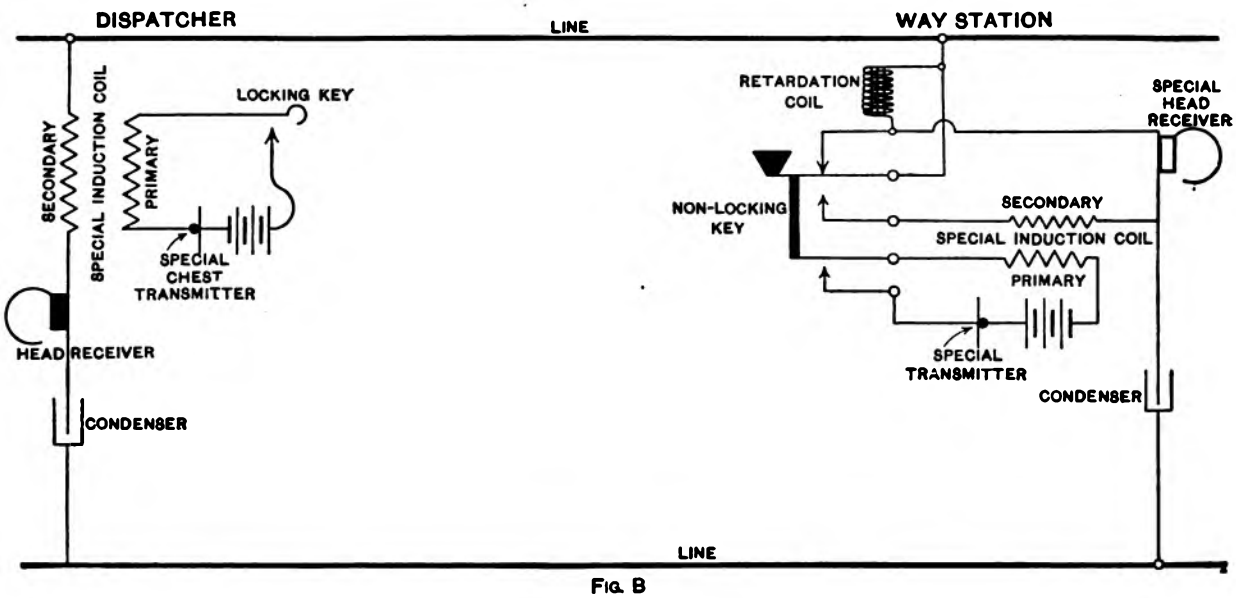


FIG. B

The induction coil and transmitter are also special for this purpose. Three cells of dry battery or their equivalent are used for transmitter battery, the latter being in use only during the time the operator is actually talking. In developing this circuit and apparatus, the problem has been studied as a whole, rather than as a problem of transmitting or of receiving the same. The various pieces of apparatus have been designed to work together, having in view the best possible results as a whole. This scheme is in use on circuits up to over two hundred miles with as many as forty-five stations; twenty of these stations can be listening simultaneously without seriously impairing the transmission on the line.

Book Reviews.

Elementary Manual of Radio-telegraphy and Radio-telephony, by J. A. Fleming (Longmans, Green and Company, London; 340 pages; illustrated). This new work from the pen of Professor Fleming is intended for the use of those having an elementary knowledge of electricity and magnetism, but who are not sufficiently advanced to derive benefit from more technical work. It is accordingly written in a clear and concise manner, is well illustrated, and gives many analogies to aid in the explanation of oscillatory electric current phenomena. Among other things the author discusses skin effects due to high frequency currents, radiating and receiving circuits, proper forms of verticals and earthing, theory of long distance transmission, directive antennae, oscillation detectors, design and operation of large stations and the elimination of natural and artificial interference. The price of this book, which, taken as a whole, is a valuable addition to any wireless engineer's library, is $2, and orders may be addressed to J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

"Motorman's Practical Air Brake Instructor," by George R. Denehie (Frederick J. Drake and Company, Chicago; 280 pages; 151 illustrations), is a concise and up-to-date treatise on the construction and operation of different types of air brake equipment used in modern electrical transportation. In addition to descriptions and explanations of the various air brakes in general use, the book gives some valuable hints to motormen, together with an extensive list of questions and answers to the same in regard to the use, care and operation of air brakes. The book, being of a handy pocket size and bound in flexible leather, is convenient for the use of those for whom it is written, and should be of great value to any motorman who desires to perform his duties as intelligently as possible. Price, $1.50. Orders may be addressed to J. B. Taltavall, Telegraph Age, 253 Broadway, N. Y.

LETTERS FROM OUR AGENTS.

PHILADELPHIA, WESTERN UNION.

Mr. W. A. Sawyer, our new superintendent, has made an inspection of the main and branch offices, and has been introduced all around.

Among those who have returned from vacations are: John McCoy, Miss Annie Ferguson, R. C. Murray and E. L. Maize.

Among recent visitors were the Misses Carrie Roesche and Clara Riddel, of the Cincinnati operating force; E. W. H. Cogley, manager of the Lewistown, Pa., office, and Miss B. V. Abrahamson, manager of the Columbia, Pa., office.

Miss Edna Shinn, daughter of H. A. Shinn, the well known base ball telegraph operator, was married September 14 to Mr. C. L. Fritz.

DETROIT, POSTAL.

Francis Hayes, aged eighteen years, the eldest son of Mr. J. Z. Hayes, chief operator of this office, died on September 2.

Mr. Hayes has been away on an extended leave of absence, since about July 15. He started for Denver with the sick son, but had gone only as far as Chicago when the boy collapsed and was brought back. It is thought likely that Mr. Hayes will take his family west as another of his sons has been failing of late. In his absence Mr. B. H. Watson is acting chief operator, and W. C. Griffin is filling Mr. Watson's place as night chief.

NEW YORK, WESTERN UNION.

Chief Operator T. A. McCammon is among those who have returned from vacations.

Mr. and Mrs. F. Mackintosh have resigned to accept positions in the west.

Mrs. Noel Haig and her sister, Miss Augusta Hardy, of Oldham, England, relatives of Mrs. E. E. Brannin, who have been making a four months' tour of the States, were recent visitors at this office.

Sympathy is extended to Mr. J. M. Topping in the loss of his brother, C. E. Topping, general manager of the United States Express Company, who died September 18.

PHILADELPHIA, POSTAL.

The large high ceilinged and very artistically ornamented main office operating room has recently undergone a complete overhauling. The fresco work has been retouched and all the woodwork repainted and varnished. The walls have been painted a pleasing restful buff, and the ceiling has been covered with an ivory-white tint, which has the effect of making the entire operating room a great deal brighter.

J. H. Wilson, for a number of years manager of the office in the Bourse building, has been promoted to be cashier, vice George Lawrence. C. W. Kofink, of the 124 South Eighth Street office, goes to the office at 58 North Twelfth Street, vice H. McClellan, who succeeds J. H. Wilson in the Bourse building office. C. B Young, of the main office, succeeds Mr. Kofink.

D. Hoffman, manager of the office in the dry goods district, has resigned to accept a position with the American Telephone and Telegraph Company and is succeeded by F. R. Sauer, of the

wholesale wool and oil office, who in turn is succeeded by William Hopkins, of the mill district. office. J. Blank, of the North Second Street office, succeeds William Hopkins.

F. B. Travis, manager at Washington, was a recent visitor.

A very pleasing fact has been noted that this office is handling more business now than at any time during the past two years.

General Mention.

The annual meeting of the Telegraphers' Mutual Benefit Association will be held at 195 Broadway, N. Y., Wednesday, November 17.

A new use for messenger boys was developed recently when a prominent Washington society woman summoned a Postal messenger to assist her in buttoning her dress in the back.

At the meeting of the American Institute of Electrical Engineers, to be held on October 8, Mr. John B. Taylor will present a paper entitled "Telegraph and Telephone Systems as Affected by Alternating-Current Lines."

Mr. F. J. McKenna, of Pittsburg, who for the past two years has been employed in the telegraph department of the Pennsylvania Railroad, has accepted a position with the Postal Telegraph-Cable Company in the Pittsburg main office.

A Milwaukee paper in commenting upon the scarcity of telegraph operators, humorously pictures a telegraph manager as leaning over his desk and holding an applicant for a position by the coat collar, meanwhile telling a messenger boy to lock the door so that he can not get away.

Assessment No. 498 has been levied by the Telegraphers' Mutual Benefit Association to meet the claims arising from the deaths of Charles W. Hammond, at St. Louis, Mo.; John M. Odenwelder, at Easton, Pa.; J. Fred Hess, Jr., at Baltimore, Md.; Charles S. Courtenay, at Needham, Mass., and John C. Mulkey, at Jacksonville, Fla.

According to consular reports from Brazil at the end of 1908, the total length of telegraph lines in service in that country, including the government telegraph lines, the submarine cable extending up the Amazon River, and the foreign cables along the coast was 36,119 miles. The telegraph business in 1907 amounted to 27,810,407 words, and in 1908 to 38,794,780 words.

We are in receipt from Mr. C. F. Annett, formerly manager of the Western Union Telegraph Company at New Haven, Conn., but now a merchant of the new town of Jerome, Idaho, of an interesting booklet describing the environments of this hustling community, which is situated in the midst of a tract of one hundred and eighty thousand acres of what is now some of the most fertile land in the country.

Trade Note.

The business of the Western Electric Company for August showed an increase of 60 per cent. over the same month in 1908. The August sales were at the rate of $53,000,000 per year, and indicate that the total business for the year ending November 30, will amount to about $47,000,000.

Obituary.

Mr. S. R. Bottone, author of Bottone's "Wireless Telegraphy and Hertzian Waves," as well as many other electrical books, died recently at his home in Wallington, Surrey, England, aged sixty-eight years.

Mrs. Octavene F. Alley, who at one time was manager of the East Pittsburg office of the Western Union Telegraph Company, and was well known in telegraph circles around Pittsburg, died at her home in Wilkinsburg, Pa., August 9, aged forty-three years.

E. G. Cochrane, general superintendent of the Postal Telegraph-Cable Company, New York, until June 1, 1908, when he retired, died at his home in Manchester Centre, Vt., on September 27, aged fifty-six years. The funeral was attended by many of his official associates.

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PHILLIPS CODE.

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

Many expert code operators have examined the revised edition of this code, and all unite in pronouncing it perfect. Mr. George W. Conkling, who has won the championship for sending code in many tournaments, says:

"I have examined thoroughly the additions contained in the latest edition of Phillips Code and most heartily approve of them. Every operator who is familiar with the code should find no difficulty in mastering the new contractions as they 'fit in' smoothly and I think the ground has been entirely covered."

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

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This is a book made up of bright, ably written stories and sketches, telegraphic and electrical, that should find a place in the home of every telegrapher; 160 large double-column pages; profusely illustrated. Price $1.50. Address J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

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

A new edition of Maver's "American Telegraphy and Encyclopedia of the Telegraph" is now ready for delivery. This will be known as the 1909 edition. The more important additions to the work at this time are descriptions of the Murray Printing Telegraph as now used in Europe, and of the Barclay Long Distance Printer, as operated on the lines of the Western Union Telegraph Company. This standard work on telegraphy now contains 668 pages and 492 diagrams. The new edition comes out in a new and distinguishing cover of dark green cloth. This book is a library on telegraphy in all its branches. It is used as a text-book in some of the largest universities in this country. It is written in plain English and practically without recourse to mathematics; hence it comes within the comprehension of the veriest beginner. No aspiring telegrapher can afford to be without it. This fine work will be sent to any address, carrying charges prepaid, on receipt of price, $5.00, by J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

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

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SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Earth's Magnetism; Magnetic Dip or Declination; Sun Spots, and How They Contributed Toward Advanced Knowledge of Electricity.

One of the first things one learns in the study of electricity is that the earth is a great magnet. But how few of us comparatively even suspect what a vast amount of thought has been bestowed on the subject by some of the greatest scientific minds during past centuries in order to discover, if possible, the source of its magnetism.

Naturally one wonders why the solution of this problem was considered of so great importance, but it should be remembered that in ancient times the attractive and repellent properties of a magnet was about the limit of electrical knowledge and the efforts and investigations which were then made were for the purpose of obtaining further enlightenment concerning that great and mysterious force which even to this day fills our minds with ceaseless wonder.

Some of the early theories advanced to account for the earth's magnetism were certainly very odd, viewed from the point of our present enlightenment, but they were nevertheless useful at the time as steps in the direction of progress.

Early records show that the Chinese had knowledge of the earth's magnetic properties more than two thousand years ago, and used a magnetic needle which pointed "north and south" as their guide in navigation. Owing to the apparent inaccuracy of the needle to always point to what they considered the geographical north and south pole of the earth, the first incentive to study the earth's magnetism and source was possibly due to a desire to perfect the compass as a help in navigating their ships through the seas. It was found that the needle varied regularly not only at the end of a certain number of years, but even at different hours of the day and night and at other regular intervals.

Furthermore, it was discovered that if the needle was suspended so that it could move freely in any direction, at the equator it would not only point north and south, but would lie parallel with the earth's surface, while on approaching either the north or the south pole of the earth during a sea voyage, one end of the needle would "dip" or incline towards the earth more than the other until at or near the earth's magnetic pole it would stand almost vertical. In order to account for these various phenomena it was deemed quite important that the source or cause of the earth's magnetism be ascertained.

It will be seen that instead of being equipped with voltmeters, ammeters and other latter-day electrical appliances, early experimenters had to depend principally upon a crude compass for their guidance.

One of the early theories advanced to account for the needle's dip and irregular action was that the source of the earth's magnetism was due to the presence of a vast mass of magnetic iron ore located in the center of the earth and therefore one end of the needle would be attracted stronger than the other, according to whichever extremity was in closest proximity to the polarity it seeks. Thus in the northern hemisphere the dip would invariably increase as they approached the north pole, while the southern hemisphere would cause the opposite pole of the needle to decline in like manner as the south pole was nearer.

But this theory of the locality of the magnet did not meet with general favor. It was soon discovered that the angle of declination varied not only in different localities, but at regular stated periods of the year and day, thus giving rise to the suggestion that the magnet shifted about during the earth's revolution. But as it was quite evident that a great magnet in the center of the earth could not alter its relative position and thus bring about the variations noted, it began to dawn upon the minds of scientists

that wherever and whatever agent really did cause the earth's magnetism, it was also responsible for many of the irregularities thereof, and that its source might possibly be due to external influences.

The latter theory soon became very popular and in order to determine whether the earth's magnetism was due to such external influences acting on the earth as a whole, or merely creating magnetic regions on its surface at different points, as many held was the case, Humboldt, in 1836, succeeded in demonstrating beyond the possibility of a doubt that whenever the magnetic equilibrium of the earth is disturbed the effect is noticeable simultaneously in every quarter of the globe. His method was to build observatories at various points throughout the world and have observations made by the most competent men equipped with suitable apparatus. He was successful in inducing practically all the principal countries of the world to co-operate, with the result that it was found that not only magnetic disturbances of great magnitude, but also those extremely minute were instantly and simultaneously felt at the same moment in each and every observatory, thus proving once and forever that, like a steel magnet, the earth is a huge magnet complete in itself, and that in order to disturb its equilibrium it must be acted upon by a foreign influence of some kind.

The result of all investigations and study of the subject points strongly to the now generally accepted theory that the sun is the real source of the earth's magnetism and that the latter's erratic manifestations are due to changes or irregularities in the magnetic influences of the sun itself, and, furthermore, that the seat of the earth's magnetism is principally on the crust rather than at the center of the sphere.

We thus come to the subject of sun spots. It has been demonstrated that whenever the sun's surface is covered with the dark marks called sun spots we have what are called magnetic storms, that is to say, the earth's magnetic equilibrium is disturbed, and in a degree proportional to the magnitude of the black spots. Hence it is more than probable that this question has now been conclusively settled.

In conclusion, the fact cannot be denied that notwithstanding the knowledge acquired by years of study the earth's magnetism is still a source of perplexity in some respects. The late Lord Kelvin in speaking of this subject closed an address with these words:

"As to terrestial magnetism, of what its relation may be to perceptible electric manifestations, we at present know nothing. You all know that the earth acts as a great magnet, but how it acts as a magnet, whether it is an electro-magnet in virtue of currents revolving around under the upper surface, or whether it is a magnet like a mass of steel or lodestone, we do not know."

Mr. M. H. Kerner, of New York, in renewing his subscription recently says: "I always say good things about my old friend, Telegraph Age."

Recent Telegraph and Telephone Patents.

A patent, No. 934,811, for a means for reducing the reactance of electro-magnetic devices for telephone circuits, has been issued to W. K. Howe of Rochester, N. Y.

A patent, No. 934,979, for a selective device for party line telephones, has been secured by F. J. and J. Mersman of Ottawa, Ohio.

A patent, No. 935,024, for a lock-out telephone system, has been granted to William W. Hill of Sumter, Minn.

A patent, No. 935,049, for a calling device for telephone exchanges, has been taken out by Nils E. Norstrom of Chicago, Ill.

A patent, No. 935,164, for a telegraph key, has been issued to G. S. Perry of Branford, Fla. Makes a plurality of dots with a single movement of the operating lever by means of a vibrator actuated by the lever.

Personal.

Mr. B. E. Sunny, of Chicago, an old-time telegrapher, vice president of the American Telephone and Telegraph Company and a vice president of the Old-Time Telegraphers' and Historical Association, was a recent New York visitor. Mr. Sunny took occasion to call on many old personal friends while in the city.

Mr. John Grant, who has been spending some time in this country as representative of the Transvaal government, making a study of telephone and telegraph systems and operation, sailed for Europe, October 8, on the Mauretania. After spending a month in England he will return to South Africa, arriving there about December 1.

Mr. T. M. Emerson, president of the Atlantic Coast Line Railway, is another telegraph operator who has risen to high position. Mr. Emerson was born in Muncie, Indiana, and entered the railway telegraph field at an early age. By reason of his perseverence and ability he rose rapidly until three years ago he became president of this important railway system.

The dinner which was given at the Lotos Club, October 5, to Melville E. Stone, secretary and general manager of the Associated Press, prior to his departure on a trip around the world, was largely attended. Mr. Stone was presented with a beautiful bronze shield, on which a bas relief of him is surrounded by exact representations in gold and enamel of decorations which have been bestowed on him by Japan, Sweden, Russia, Italy, Germany and France.

Mr. Norman Ringer, manager of the Western Union Telegraph Company, El Paso, Texas, has returned from a month's hunting and fishing trip in the mountains of Mexico. The trip was very successful, the party securing an abundance of large game, fish, quail, ducks, etc.

Great North-Western Telegraph Company.

At the annual meeting of the shareholders of the company, held in Toronto, September 23, the following directors and officials were re-elected: President, H. P. Dwight; vice president, Adam Brown; vice president and general manager, I. McMichael; other directors, H. N. Baird, James Hedley, Hon. J. K. Kerr, W. C. Matthews, Toronto; Col. R. C. Clowry, J. B. VanEvery, New York; secretary-treasurer, G. D. Perry; auditor, A. C. McConnell. The statement presented at the meeting showed the revenue of the company for the past year to be considerably larger than that for the previous year.

Mr. J. G. Davies, manager of the Ottawa, Ont., office, has resigned to accept the management of the Vancouver, B. C., office of the Western Union Telegraph Company. The management at Ottawa has been filled by the advancement of Chief Operator Charles E. Davies, a brother of the former manager, to fill the vacancy. The latter gentleman is the inventor of the Davies Direct-Point Repeater, which has recently been placed on the market and is meeting with considerable success.

Western Union Telegraph Company.

EXECUTIVE OFFICES.

Mr. Thomas F. Clark, vice president, is again at his office and has resumed his customary duties after a sojourn of several months in Europe for the benefit of his health. He has entirely recovered from the attack of typhoid fever from which he suffered at the beginning of the year.

Mr. Stephen D. Field, the well-known electrical engineer and inventor, and Mr. William Finn, of the electrical engineers' department, have been in Florida and Cuba trying out the former's invention to quadruplex the Cuban cable. Their efforts were successful.

Major Walter A. J. O'Meara, chief engineer of the British Post Office telegraphs, while in this city inspected the Barclay printing telegraph equipment in this office under the direction of Mr. J. C. Barclay and was highly pleased with its operation. Major O'Meara is now investigating the telegraph and telephone systems of Chicago and St. Louis and will spend several weeks more in this country before his return to England.

Mr. H. Durland, an attache of the general manager's office, was married on October 14 to Miss Mayme M. Ecker, of the supply department of the company.

Mr. J. W. Atkins, manager of the Key West office, was one of the sufferers in the recent hurricane which devastated that city, his residence being partially destroyed.

RESIGNATIONS AND APPOINTMENTS.

Mr. T. P. Masters, manager of the office at Vancouver, B. C., has resigned and has been succeeded by Mr. J. G. Davies, manager of the Great North Western Telegraph Company's office at Ottawa, Ont.

Miss Marie Wise has been appointed manager at Mannington, W. Va., vice K. N. Walker, resigned.

Annual Meeting of the Western Union Telegraph Company.

The annual meeting of the stockholders of the Western Union Telegraph Company occurred at 195 Broadway, New York, on October 13. Three new directors were elected, namely, Edward T. Jeffery, Alvin W. Kretch and Kingdon Gould, to fill the vacancies caused by the resignations of General Thomas T. Eckert and James H. Hyde and by the death of Edward H. Harriman. The other directors were re-elected as follows: Robert C. Clowry, John Jacob Astor, J. T. Terry, Oliver Ames, George J. Gould, C. Sidney Shepard, Edwin Gould, John B. Van Every, Frank J. Gould, James Stillman, Jacob H. Schiff, Thomas F. Clark, William L. Bull, Howard Gould, Joseph J. Slocum, John J. Mitchell, Thomas H. Hubbard, Henry A. Bishop, Harris C. Fahnestock, J. Pierpont Morgan, Henry Walters, Charles Lanier, G. W. E. Atkins, Chauncey M. Depew, Paul Morton, Henry M. Flagler, Robert M. Gallaway.

The annual report of President Robert C. Clowry for the fiscal year ending June 30 shows a net revenue of $7,347,106, as compared with $3,402,996 for the preceding year.

The figures submitted in this report are naturally favored by a comparison with the adverse conditions of the previous year, as indicated in the previous annual report, but irrespective of this comparison they show that the company has participated fully in the marked improvement in all lines of business which is being experienced throughout the country. 5,682,152 more messages were handled than during the preceding year.

An increase of 3,036 miles in the mileage of poles and cables is shown, with an increase of 23,070 miles of wire, of which 14,200 miles is copper. The number of offices has been increased to 24,321, due in part to the re-opening of some of the offices temporarily closed by railroad companies.

Disbursements on construction account aggregated $947,295.77, or $191,210.97 less than last year.

Contracts covering 4,073 miles of railroad were closed during the year.

A development since the close of the fiscal year is the sale of the company's holding of New York Telephone Company stock. The plans of that company for acquiring other telephone properties involved the raising of a large amount of additional capital by the sale to stockholders of an issue of $35,000,000 of new stock. It was thought inadvisable for the telegraph company to undertake to raise the large sum required for its proportion of the new issue, and advantage was taken of a favorable oportunity to dispose of the minority interest in the telephone company to the American Telephone and Telegraph Company.

In connection with this sale arrangements have been made for retiring on May 1, 1912, the $10,000,000 four per cent. convertible bonds of the company which are redeemable at the pleasure of the company on and after that date.

Postal Telegraph-Cable Company.

EXECUTIVE OFFICES.

Mr. Shirley M. English, president and general manager of the Postal Telegraph-Cable Company, of Texas, was a recent New York visitor.

The funeral of Edward G. Cochrane, formerly general superintendent of the company at New York, whose death was announced in our previous issue, was attended September 30 by a number of his former official associates.

Among those in attendance were E. B. Pillsbury, general superintendent; Edward Reynolds, auditor; superintendents Kimmey, Leonard, Bagley, Scrivens, Edgecomb and Lane, assistant traffic manager Shirley, and foreman T. F. Jennings —all of whom were closely associated with and subordinate to Mr. Cochrane in the service of the company, and Mr. Chas. P. Bruch, vice president. Mr. Geo. W. Blanchard, Mr. Wm. H. McCollum and Mr. Albert C. Kaufman, formerly employed by the company and associated with Mr. Cochrane, were also present.

Mr. E. Reynolds, auditor of the company, as secretary of the Greene County Society in the City of New York, attended the Hudson-Fulton celebration at Catskill, N. Y., on Greene County Day, October 6, and presented a flag to the Home for Aged Women located at that place, which was given by the society.

RESIGNATIONS AND APPOINTMENTS.

Mr. John J. Hull, of Omaha, has been appointed cashier at Des Moines, Iowa, vice Miss Rose Zeh, resigned.

Results of Rowland Operation.

Editor Telegraph Age.

Dear Sir: Some of the newspaper comment upon the determination of the Postal Company to discontinue the use of the Rowland Printing Telegraph indicates much misconception of the facts. The following brief statement shows the great carrying capacity of the printer and the reasons why this capacity is not conclusively advantageous under present traffic-handling methods.

The Rowland printers have been in operation for about two years upon six of our important circuits, three being operated in octoplex, two in quadruplex and one in duplex.

The octoplex circuits show an ordinary carrying capacity of from 2,000 to 2,500 telegrams of thirty words each per day. The other circuits have the same relative carrying capacity. When there is more active traffic, we have found the system generally to be capable of carrying approximately fifty per cent. more than the above mentioned traffic, when the operators were called upon to make the effort.

One of the quadruplex Rowland installations has been in operation on the line from New York to Chicago (about 1057 miles) for nearly two years, and includes a Rowland repeater at Meadville, Pa., midway upon the circuit. This circuit has never hitherto been operated on quadruplex so satisfactorily as with the Rowland system.

One of the quadruplex circuits is operated between New York and Pittsburg, Pa., and presents unusual conditions, because of the fact that the wires pass through the coal regions, and are unavoidably coated with carbon to a considerable extent. The method of operating this circuit with the Rowland system has largely obviated any difficulties in that section resulting from these conditions, and our quadruplex operation of this circuit with the Rowland is more satisfactory than it has been with the Morse quadruplex.

Our operators are young women, inexperienced in Morse telegraphy, and, in general, they have proved able to sustain a rate of 300 messages per day, and some of them are able to increase this to 400 messages per day and sometimes 500 messages per day.

We have found the method of half working when difficulties of balancing occur, an important and useful improvement in the Rowland system.

We have occasionally found it possible to operate the Rowland circuit in full octoplex when it was difficult, on account of weather conditions, to operate with Morse in any larger capacity than that of duplex.

The standard-model Rowland apparatus is well constructed and durable.

By the employment of low-priced operators, we have been able to effect economies in labor cost, and it is obvious that the use of the Rowland at times results in considerable wire saving.

On the other hand, we have not succeeded in maintaining Rowland operation at all times so steadily as not to conflict with a prompt service. Although the Rowland carries a large amount of traffic, it is subject to more or less frequent interruption. We cannot keep all the parts of the machine constantly operative and we do not keep reserve installations.

To secure successful operation the Rowland must be used upon wires with which the Rowland attendants are familiar. The Rowland cannot be promptly placed in operation upon a wire which has not previously been used in Rowland service, or one whose characteristics have not been approximately noted so as to avoid delay in getting started.

The recent determination to prevent every avoidable delay to telegrams has brought into prominence the somewhat numerous interruptions that take place in the operation of an intricate page printer. It has become necessary to greatly increase the amount of printer apparatus held in reserve, or to provide a reserve of Morse operators and equipment always ready to supple-

ment the work of the printer. To prevent delay to traffic either of these reserves would have to be too expensive to permit economical operation of the printer and for this reason we have decided to stop using the printer for the present.

Although the use of the Rowland system has extended over a period of several years, this use has always been experimental. Modifications of the Rowland apparatus have been suggested and it is quite possible that further experiments will be made.

Yours truly,

Charles P. Bruch.

Vice President, Postal Telegraph-Cable Co.

New York, October 8, 1909.

The Cable.

The cable, about ninety miles in length, between Dalny and Cheefoo, is owned jointly by the Chinese and Japanese governments. Messages between these two ports were formerly sent via Sasebo, Nagasaki and Shanghai at a cost of forty-eight cents per word. The rate between the two places on the direct route is eight cents per word.

It is rumored that the Direct United States Cable Company is making plans to follow in the footsteps of the Commercial Cable Company and operate their cable service via Newfoundland.

The report of the Pacific Cable Board for the year ending March 31, 1909, shows that the receipts for the year were £114,825. The speed of the duplex transmission on the Bamfield-Fanning section has been increased to 90-97 letters a minute, although it was originally expected that the speed on this section would not be over sixty-five letters per minute.

The Newfoundland Cable Controversy.

The work of the Commercial Cable Company in putting its underground conduits in the streets of St. John's in order to connect its city office with the place of landing of its cable has been stopped by the Newfoundland authorities.

This renders it necessary for the cable company to continue the operation of its cable in the hut on the seashore, which is one of the wildest and most desolate. On this account the cable company has decided to ask the United States Government to intervene.

Sir Edward P. Morris, the Premier of Newfoundland, when interviewed recently in regard to the effort being made to deny the Commercial Cable Company its rights under the contract made with the Newfoundland government while the Bond ministry was in power, and to prevent it bringing its wires into St. John's, said:

"The government does not recognize the Bond ministry's contract, but the company can fulfill its obligations with respect to the colonial ministry by admitting its liability for the annual tax for landing its cables on our shores.

"With respect to the municipal streets, that is a matter for the city council."

Mayor Gibbs, the head of the city authorities, who is also a member of the Morris ministry, says the city's position is that it should receive from the Commercial Cable Company an equitable sum for using its highways, which sum, the city council thinks, should be $2,000 a year.

Judge Prowse, the leading historian of the colony, writing in an English paper, a few days since, expresses the opinion that the cable company will have to make terms with the government. The Morris ministry's newspaper organs advocate the city's prosecuting the company for opening the streets. The Commercial cable authorities say the Morris repudiation of the Bond contracts is unwarranted and unprecedented and that the Municipal Council's demands are exorbitant.

It was last June that the Morris ministry repudiated the contract which the Bond ministry entered into with the Commercial Cable Company last February, just before Mr. Bond resigned his office. In repudiating the contract the Morris ministry gave it out that the reason was that the contract required ratification by the Legislature.

Meanwhile the cable company had manufactured thirteen hundred miles of new cable, with which to connect one of their existing Atlantic cables between England, St. John's and New York. This cable was landed late in July at Cuckoldscove, three miles from St. John's.

The company's intention was subsequently to carry the wire into the city, where it had purchased a site in the principal business centre on which to erect a large office building. The repudiation of the contract left the cable company in an awkward position being liable under these conditions for $8,000 annual cable tax, besides which St. John's demanded from the company the $2,000 yearly for the right to open the streets, dig trenches in which to lay cables, erect telegraph poles and wires and otherwise use the public highways within the municipal limits.

For the last two months the cable has been doing a through traffic business between London and New York and vice versa. It has no connection with Newfoundland business. A staff comprising a superintendent, electrician and six operators, is employed, and as it is difficult for them to get to the scene of their labors from the city, the hut has had to be enlarged, bunks provided and a kitchen attached, so that the men can sleep and eat on the premises.

A California newspaper has suggested a new way for the telegraph companies to dispose of some of their supposed enormous profits. The proposed plan is for one of the companies to contribute $25,000 toward paying for a new Young Men's Christian Association building.

Some Early Speed Trials.

Editor Telegraph Age.

Dear Sir: The headlines "Old and Recent Tournaments" in the "Age" of October 1, revived my recollection of speed trials with which I had incidental part while manager of the Western Union at the National Capital. On searching the pages of my ever faithful daily journals, I find record of them, which I will quote verbatim, as of possible interest to "Professional" readers while the subject is under consideration.

Wednesday, January 15, 1868.

Trial in speed telegraphing ordered by General Eckert between this city (Washington, D.C.) and Plaister Cove, C. B., came off this evening, but did not prove successful, the distance being too great to work with so little battery as was allowed. We managed to get off twenty-five words a minute.

Thursday, January 16.

This evening we made another trial, in sending press report to New York. Stewart sent 2,243 words in sixty minutes.

Sunday, January 19.

I went to the office this morning and made an experiment, ordered by General Eckert, to see how many twenty-word messages can be sent in one hour over a direct circuit between this city and Plaister Cove. Operator William E. Kettles sent ninety-four—average, thirty-one and one-third words a minute. Distance, 1,400 miles.

Thursday, February 20.

By order of General Eckert, Operator Stewart made another trial of speed, this time sending 2,566 words in one hour to Snyder in Philadelphia—an average of forty-two and two-thirds words per minute.

I cannot now recall Operator Stewart's full name, but he and Kettles were selected for the speed tests on account of their local reputations as accurate and rapid manipulators of the key.

I felt some pride in Operator Kettles' success for I was responsible for his leaving home, and employment in the Burlington, Vt., office when a mere lad, as diminutive in stature as in years, and securing him a position in the War Department office. Here he rapidly developed into a first-class operator, both with pen and key. To his petite physique he can undoubtedly credit the "event of his life," when the great War Secretary, in his enthusiasm of the moment, performed the now historically athletic feat of holding the boyish operator, who received the message announcing the fall of Richmond, out of the War Department window to the admiring gaze of the enthusiastic throng which had quickly gathered there and were wildly cheering for the glorious news. An incident not soon forgotten by one who witnessed it but which could not have occurred had it fallen to the lot of Bob Cunningham or A. H. Bliss to receive that first message from fallen Richmond. Very truly yours,

Chas. A. Tinker.

Brooklyn, N. Y., October 11, 1909.

Several managers of telegraph offices have been arrested of late charged with violating the child-labor law by having messengers in the employ of their respective interests who were alleged to be under age.

Severe Magnetic Storm.

Earth currents of unusual strength were felt throughout the United States, as well as in European countries, September 25, foreign voltages as high as 500 being noted on some circuits. While such "magnetic storms," as they are sometimes called, occur quite frequently, it is not often that they are severe enough to demoralize the telegraph service as badly as on this occasion. The theory has been advanced by some that the aurora borealis is associated with the electro-magnetic systems of the earth. The probable explanation, scientists say, is that solar radiations possess electro-magnetic energy, which divide into two fields when reaching the earth. One passes through the earth and the second acts by the law of magnetic reflection. Such electric showers appear usually at this season. Even cables on the ocean bed are affected by them. In some instances during the recent disturbances the cable operators could not touch their instruments without receiving severe shocks. A repetition of the trouble in a lesser degree was experienced October 8.

Inauguration of New News Service.

The Publishers' Press of New York inaugurated its Sunday leased wire service on Saturday evening, October 2, with a news service extending from New York to the Pacific coast, supplying papers at Pittsburg, Chicago, Minneapolis, St. Paul, Denver, Oakland, Cal., and other cities. On October 16 the service will be extended to New Orleans. No date has been set for the beginning of the morning and evening services. The new concern began operation under the supervision of Mr. Curtis J. Mar, general manager, and with an able corps of correspondents scattered throughout the United States and Europe, and has excellent prospects of achieving a marked success.

The Magnetic Club.

The Magnetic Club of New York will hold its annual fall dinner on Wednesday, November 17, at the St. Denis Hotel. The delegates to the annual meeting of the Telegraphers' Mutual Benefit Association, as for many years past, will be the guests of the club on this occasion. Mr. Charles P. Bruch is president and Mr. Theodore L. Cuyler, Jr., is chairman of the committee of arrangements.

Municipal Electricians.

Mr. Frank P. Foster, secretary of the International Association of Municipal Electricians, is busily engaged in getting out the printed report of the proceedings at the annual convention at Atlantic City. The bound volume, which is the fourteenth in the series, will be one of the best yet produced on account of the importance to those connected with municipal electrical circles of the topics discussed and the able manner in which they were treated by those taking part in the discussion. The book will probably be ready for distribution within two months.

Ether of Space.*

BY F. E. D'HUMY.
Assistant Electrical Engineer of the Postal Telegraph-Cable Company, New York.

It may be of interest to some of us to wander a few moments from our every-day occupations and acquaint ourselves with that most marvelous and important substance known as ether. It is the ether of space that is referred to—not the anaesthetic used by surgeons while carving their patients.

Ether cannot help but be of interest to telegraphers since the advent of wireless telegraphy.

To lead up to a comprehensible understanding of this most intangible substance it may help us if we use, by way of analogies, some physical phenomena with which we are all familiarly acquainted; we will therefore start with the well-known phenomena of sound and then follow with light, and by the latter show evidence of the all-pervading ether.

It is, of course, generally known that the transmission to a distance of light, heat, sound, power, etc., requires some intervening medium as a means of conveyance. For instance: In the mechanical transmission of power, the belt or shaft may be considered the conveying medium of mechanical energy; in sound transmission the air is the conveying medium, and in the propagation of light or heat the ether is the conveying medium.

The propagation of sound may be explained as follows: A body emitting sound is in vibration, moving to and fro. This motion is imparted to the air in little waves or ripples which keep traveling outwardly until their amplitude ultimately dies down to nothing. This can be nicely pictured by dropping a pebble into a pond and watching the small annular ripples which rapidly spread outwardly to larger diameters until they ultimately strike the bank or dwindle to nothing.

That air is the medium by which sound travels is demonstrated by the well-known experiment of placing an electric bell in a glass chamber and then gradually pumping the air from the chamber until the sound of the bell ceases to be audible, although the vibration of the tapper against the gong can be plainly seen through the glass walls of the chamber.

The action of carrying sound from a vibrating body to the ear is mechanical, just as the transmission of power from one pulley to another by means of a belt is mechanical.

The ripples in the air produced by a vibrating body are termed "sound waves." These waves, unlike the visible waves that were seemingly confined to the surface of the water when we dropped the pebble in, are not confined to one surface or strata, but unless given direction, such as by means of a megaphone or the like, propagate spherically, that is in all directions through the body of the air.

*Article appearing in October issue of "Postal Telegraph."

Air is an invisible material substance in a gaseous state. We are only cognizant of its presence when it is in motion, by the wind or breezes we feel, or when its temperature changes from normal by the sensation of heat or cold, or by the act of breathing or by the sensation of sound. Eliminate sound, motion, or the necessity for breathing and we find ourselves physiolologically unconscious of the existence of air. In early childhood we are utterly unconscious of its presence. Our baby arms swing and beat the air without our becoming conscious of its resistance. Yet at this stage our education is sufficient to enable us to recognize one solid from another, for do we not already distinguish papa from mama?

It is only as we grow older and our education develops to a stage where we exercise reasoning power that we begin to realize the existence of the atmosphere. Similarly, the lower order of animal life is unconscious of the existence of the atmosphere. Even a fish in water is not cognizant of the medium in which it lives. It can move about with ease. Progress from one position to another is seemingly hampered. It can rise, go downward, forward, turn around and remain stationary, all without apparent resistance from the water. With the lower mental development that we imagine a fish to possess it can be justly accepted that it is entirely unconscious of the water.

It is now clear to us that our knowledge of the presence of our atmosphere is simply a degree of education. Once realizing this, it is not difficult to conceive the possibility of the existence of something infinitely less tangible than our atmosphere and yet fully as important to our existence.

Now, then, in addition to the senses of feeling and hearing, we have an equally important sense, which is that of sight. While the latter phenomena may seem more difficult to clearly understand it cannot be considered more wonderful than that of sound, for a further development of our education teaches us that they both work on the very same principle. This is, mechanical vibration. Sound is mechanical vibration of the substance composing our atmosphere, and light is the mechanical vibration of ether. The air vibrations affect the nerves of the ear, the ether vibrations affect the nerves of the eye.

We have already seen that our knowledge of the existence of our atmosphere was a progressive step in one's education and was acquired by reasoning only. By carrying this progression a step further, and having determined that light is vibration, we reason that light, like sound, must of necessity have a medium for conveying it to a distance, but in this case, instead of air being the medium, we have the substance which has been named ether.

Ether, when not in motion, like air, does not become evident to our senses.

Ether is far more extensive than air, it is all-pervading, it extends throughout the universe, it is present in all matter everywhere. We ordinarily are unable to conceive of ether as having any density; on the contrary, our conception of it is generally rarefication in the extreme. We cannot see it, touch it knowingly, taste it, smell it, etc., etc., and we are absolutely unconscious of its presence.

The only way we know of its existence is by mental reasoning. We know there *must* be a medium for the propagation of light and heat.

Having thus determined the existence of ether, the undulatory theory of light can be explained as follows:

The atoms or molecules of a luminous body, such as a candle flame, a gas flame, an electric lamp, etc., vibrate with infinite rapidity, and these vibrations are imparted to the ether in very much the same way as a piano string imparting vibrations to the air produces the phenomena of sound. When these ether vibrations, or ether waves, impinge on the retina of the eye we experience the sensation of light. These waves or vibrations are very rapid and vary in frequency for different colors. Calculations have shown that when light waves are manifested as red light the rate of vibration is about 400,000,000,000,000 per second, and when manifested as violet light, about 700,000,000,000,000 per second, and for yellow, blue, orange, etc., the rate of vibrations falls between these figures. To better conceive the high rate of these oscillations let us compare them with sound:

To produce the note C, 261 oscillations of air per second are required.

The rate that light waves travel is about 186,000 miles per second, while sound waves travel about one-fifth of a mile per second.

An ether light wave is about one sixty-five thousandth of an inch long; an ether wireless telegraph wave may range from a few feet in length to 100 feet or more, and an air sound wave for the note C about 4.3 feet long.

Ether is everywhere; it extends throughout the entire universe, permeates everything, even solids of the greatest density. It is true that ether light waves do not manifestly pass through all solids, for wood, metals and many other substances are opaque to light, but we have other solids equally dense and hard as those mentioned—glass, for instance, through which the ether light waves are carried with but very little resistance.

We have seen that wood is opaque to light waves, but it is not opaque to ether waves, known commonly as X-Rays. These pass with ease through wood and some other substances that are opaque to light waves.

Ether wireless telegraph waves are found to pass through metals, stone, earth, glass, anything, in fact, with greater or lesser facility.

The probable reason that light waves do not pass through metals and yet do pass through glass is due to the inability of the ether permeating the mass of the metal to vibrate at the frequencies of light, while the ether permeating the mass of the glass has no difficulty in vibrating at those frequencies. If this is the case there is no doubt that each substance permits its permeated ether to vibrate at its own attuned frequency and tends to resist frequencies varying from this.

It has already been said that ether is ever present everywhere. We live in it, like fish in water. More than that, we not only live in it but the ether also permeates our bodies. Physicists have concluded in recent years that ether is many million times more dense than the densest matter known to man, such as gold or other dense substances, that it possesses a strength many millions of times greater than the strength of steel; that it is capable of motion or vibration more rapid than anything else known.

Yet, notwithstanding this inconceivable density and strength, we are entirely unconscious of its presence physiologically and we move through it with absolutely no resistance.

Mr. Vail's Secret of Success.

In a recent newspaper interview Mr. Theodore N. Vail, president of the American Telephone and Telegraph Company, gave the following answer to the question: "What is the chief essential to success?"

"Work, hard work, is the first essential to a young man's success in the business world, but he must have ability in order to rise. Young men should be taught that lesson as a fundamental.

"Better times are coming and young men should be ready to meet them, determined to do their best in aiding prosperity.

"A man must deliver the goods or get out of the way and let somebody else do it. There is no room for ornamental relatives—they must work their passage and a little better.

"It is foolish to teach the doctrine that every man has in his hands the implements necessary to hew his way to success. Every man does not possess the implements, but the idea is sound if rightly interpreted. The teaching, however, too often appeals to a lot of young men who have great ambitions but small abilities. Ability and ambition are sometimes so proportioned that they produce no promotion and no contentment. There might well be more applicants for clerkships and less for managers by men who cannot rise to command. They should try to fill their places well, and they would live happier and die happier.

"Great corporations want a man to go up if he is able. They want to see the office boy reach the topmost round of the ladder; but there is no royal road, for it requires hard study and unremitting toil."

How to Begin the Study of Electricity.

BY CARL OTTO, CHICAGO.

The article on "Psychology of Successful Effort," in the September 1 issue of Telegraph Age, ought to be read by every ambitious student of the telegraph, be he following the technical or the commercial route of the profession.

It is a well known fact, that while there is room on top for the industrious, the learned, the ambitious and the experienced in the telegraph business, there are after all, only a few chosen, but luckily, the preparation—the telegraph schooling, as training for an outside career, as telegraphers usually call it, equals almost that of any business or commercial school, naturally, of course, depending upon the individual. Much has been written and explained on that subject, and we have many shining examples of men high in public, professional and commercial life, graduates of the "College of the Telegraph," that university, without faculties, set curriculum, gown, cap or diplomas, but with results, spelled with a capital R.

Quoting Professor Bryan, "The difficulty lies in the fact that so many young people are not able to cross over this period of non-progression," I will now try, with a few hints and helps, especially to the younger members of the fraternity, to point a way to overcome these periods and to aid them in obtaining at least a start in the study of that useful and fascinating subject of electricity, and, at the least cost to them.

First of all, subscribe for Telegraph Age, get acquainted with your own profession, and lose no time in reading the articles on electricity, as they appear from time to time, in fact, in every issue. Many of them will not, as a matter of course, be very intelligible to you at first. Next get an inexpensive A. B. C. of Electricity, read it through, and what you cannot understand at the first reading, pass on, and try again, later. Then get a "Jones Book," which will be a valuable companion to you, as long as you stay in the telegraph business. Read the introduction over carefully, pick out the instruments with which you are most familiar, and try to understand them as well as you can. If you meet with difficulties, ask some more experienced friend a few questions now and then and study your surroundings, but do not be annoying, as some questions could not be answered satisfactorily to you unless you have some fundamental knowledge of the subject.

To do justice to correspondence courses, which are, in my opinion, excellent vehicles to carry the student to a certain goal in the technical field, I must say, that whoever is sure of the necessary perseverance, has the facilities of some public manual training, or technical high school, or has the opportunity to compare his studies with his practical work, which the telegrapher as a rule has not, can make good, but without these adjuncts, as the Professor quotes, "After spending weeks or months of painful effort, the work fails and goes for naught."

Next to Jones' Pocket Edition of Diagrams, get a copy of Houston and Kennelly's Leaflets, elementary edition, or a book similar to that, without much arithmetic, but written in clear and concise language, read chapter after chapter, as much as you can read without crowding your mind. From the time you first subscribed for the Age, up to now, there may have elapsed ten days, three weeks, or three months, it depends upon you and your circumstances, but observe how much easier it will be for you to read some of the technical articles in the Age.

The next step would be to improve your arithmetic. Laird and Lee publish an inexpensive book on that subject, giving examples and working them out for you. Don't forget algebra; the little you use in the easy calculations at the start, is easily comprehensible. Study ohm's law thoroughly, and fix it in your mind, so that you have it at the ends of your fingers. A little effort will do that.

Another somewhat more advanced book is Jackson and Jackson's Elementary Electricity and Magnetism, and now would be the time for you to enroll in some evening class of a free manual training school, such as are found in nearly any large city, as Cooper Institute in New York, or Lane and Crane, in Chicago. By that time you will also know, whether you care to go to the expense of a correspondence school course, or take up a course in some similar institution.

To sum it all up, use Telegraph Age as your electrical thermometer, so to speak. The ability to understand more and more of its articles, as you go along, will certainly help you over those periods of non-progression, and you can look backward as to how much you achieved, and with only a few dollars of expense. As a guide for your telegraph work, the Jones book is second to none. Your advancement depends upon yourself.

If you are lucky enough to secure an assignment as assistant wire or quad chief, the better, but, suppose you should never get an opportunity to put to practical use what you have learned, the hours spent in studying, if you were at all interested in the subject, were hours of pleasure to you, besides, your mind obtained a certain amount of mental training, which is equivalent to the physical benefits an athlete derives from training and exercising his muscles.

Mr. G. M. Dugan, now living in retirement at Tip Top, Ky., but formerly superintendent of telegraph of the Illinois Central Railroad, in a recent letter states:

"I enclose you herewith $2.00 to renew my twenty-sixth consecutive subscription to your valuable and instructive paper, coupled with my best wishes for its contined success."

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OCTOBER 16, 1909.

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

To Benefit the Telegraph Operators.

The efforts of the Postal Telegraph-Cable Company to discourage the use of obscure words and groups of letters and figures by telegraph patrons for secret code purposes ought to be met with encouragement from every one who has any regard for the comfort and well being of his fellow men. During recent years the use of secret codes by commercial firms has increased greatly and at the same time the combinations of letters used have increased in complexity until now telegraph operators are called upon to send such combinations as bacizafyih, beconalinf, benewamvay, bobilajek, bilefamusp, bilantovre, chasadacha, etc. The mere reading of these expressions is a severe strain on the eye, the manipulation of the telegraph key in producing such unusual sequences of telegraph signals is tiring to the hand and arm of the sending operator and the work of the receiving operator in reading the unusual sequences and reducing them to the uncouth-looking expressions in script is wearisome in the extreme. The ear, the eye and mind are subjected to intolerable strain and the operator must be in a state of high nervous tension constantly in order to be sure that he makes no mistake in transcribing a single letter. With such a condition of affairs it is no wonder that telegraphers in commercial service are continually suffering from nervous breakdown and writer's cramp and their life of usefulness much shortened. The action of the Postal Company can not help but result in a great benefit to the health of the operators by relieving them of much of this unnatural strain. In taking this action they are following in the footsteps of the English Government which, ever since the London conference of 1903 made allowable the use of such combinations of ten letters each as one word, has discouraged the using of those expressions which were difficult of transmission and has issued warnings that if more care was not used in making up these ciphers the privilege of using them would be curtailed.

The new rule, while causing a temporary hardship to those who have considered only their own convenience in making up their codes and have not taken into account the difficulties of the operators sending the resulting messages, will be a blessing to the operators as well as an aid in improving the service.

American Institute of Electrical Engineers.

At the regular monthly meeting of the American Institute of Electrical Engineers held in the Engineering Societies Building, New York, October 8, Mr. John B. Taylor, of the General Electric Company, Schenectady, presented a very interesting paper upon "Telegraph and Telephone Systems as Affected by Alternating Current Lines." Mr. Taylor having spent several years in investigating the effects of induction, from alternating current transmission systems, upon paralleling telegraph and telephone lines was able to give a large amount of valuable information upon this subject and in fact his paper, a portion of which is printed elsewhere in this issue, may be said to give a complete resumé of all that has been accomplished up to the present time in the way of devising means to overcome the harmful effects of the power lines upon their weaker brothers. His presentation of the subject was listened to with great interest by a large number of telegraph and telephone engineers who were present. In the discussion which followed a description was given of the methods used along the electrified portion of the New York, New Haven and Hartford Railroad to overcome the effects of the induction from their single phase transmission system upon the telegraph wires which parellel it, in many places at only a short distance. In this case the inductive disturbance has been neutralized by means of transformers. A wire parelleling and having practically the same exposure to the transmission system has placed

in series with it the primary windings of specially wound transformers. The secondary windings of these transformers are connected in series with the telegraph wires in such a way that the voltage induced in the transformer secondary opposes and neutralizes the voltage induced in the telegraph line by the transmission system.

With this arrangement the telegraph lines, twenty in number, are operated with entire satisfaction with the exception of one New York-Boston wire which sometimes gives trouble during the hours when the railroad traffic is heavy. This is an iron wire however for the greater part of its length and hence its low conductivity probably accounts for the trouble in its operation. The only difference noticed in the maintenance of these wires since the electrification of the road has been an increase in the number of fuse burn-outs. In most cases these have been found to be due to the unbalancing of the two systems caused by the breakage of insulators and the grounding of the transmission system.

A Letter of the Late Robert Pitcairn.

The following letter which the late Robert Pitcairn, of Pittsburg, wrote to his younger brother, Hugh, who is now consul-general at Hamburg, Germany, when the latter at the age of twenty was appointed superintendent of the Northern Central Railway, was read at the Pittsburg reunion of the Old Time and Military Telegraphers by Colonel William Bender Wilson, who considered it as most characteristic of Mr. Pitcairn's life:

Pittsburg, Pa., February 1, 1866.

Dear Hugh:

I am in receipt of your letter of the 28th ult. I rejoice very much at your appointment and trust in my heart you will succeed. We are all glad to hear of your prosperity. You are mistaken in regard to my feelings; I would think as much of you as I do now if you were as poor as poverty could make you and held the lowest position, if you were only honest and lived a good life, yet still I am glad you have succeeded and would always have blamed you had you not from the fact that I knew it was in you and if you did not succeed it was because you did not try. "There is a tide in the affairs of men which if taken at the flood leads on to fortune and fame." Now is your flood of time, if you take advantage of it you are made forever, if you miss it then it will be a more severe struggle to get the same chance again and perhaps you never will. How can you take advantage of the flood? By bearing your honor meekly. Not appearing to feel your position, but still show you have confidence in your ability. Putting on no airs, but still being decided and dignified, always remembering that your youth is against you. By keeping a close mouth and not showing your ignorance. A Pitcairn can't blow, can't talk well and his only chance is in keeping quiet. By having no confidants unless it is your brother John. By putting nothing on paper that you can't say verbally unless it is a train order. Always be careful what you write, remembering that it may appear against you when least expected. Be careful, weighing all your actions, doing nothing rash, being sure to get all the facts before you decide a question. Having no temper. You will always make a fool of yourself unless you control your temper. Having no feelings, but calmly and dispassionately weighing everything and acting earnestly and for the best interest of the company without regard to yourself. By being pleasant and making yourself agreeable to all, remembering your failing which is also mine. Talking very little with the employes, but still being pleasant to them. By a close and constant attention to business, always bearing in mind your health, which is not the best. Even the Presidency of the United States would not compensate you for the loss of your health. If you are in love, say that until I succeed I will not allow it to divert my thoughts or take away my attention from any business, and, above all, when you are running trains by telegraph be very careful and not allow your mind to be diverted a single moment until you are entirely through and never leave the office an instant until you are, and as long as you are engaged in running trains to keep your mind intensely fixed on the same, always looking for the men to make a mistake and misconstrue your message. Always examine your messages, reading them often and see if a misconstruction could be taken therefrom, trying every message to make it more pointed, more clear and more safe. An accident would kill you. A mistake that the men or operators would discover would make them lose confidence in you, which would hurt you much. In a railroad man success is the only criterion and the only way they are judged. When asked a question by the men that you are not altogether clear upon postpone your decision until you can get light and are sure. Engrave this upon your mind. Take no risks. In case of doubt take the safe course. The above is the amount of my fifteen years of railroad experience; it might be of benefit to you to read them morning, noon and night. With much love, I am,

Your affectionate brother,

ROBERT.

According to consular reports from Korea since the Japanese authorities took over the telegraph and telephone lines in that country, in July, 1905, the total length of the telegraph lines, then about 1,930 miles, has been increased to approximately 7,000 miles. The telephone system, five years ago, existed principally at Seoul, aside from lines on mining concessions, and the total length of the wires was less than 100 miles. Today it exists in all the principal cities, its length having increased to over 4,500 miles.

M. Millerand, minister of public works, posts and telegraphs of France, is in favor of a plan to send graduates of French technical schools to the United States for further study.

OLD AND RECENT TOURNAMENTS.

General Information as to Early and Late Speed Trials, with Incidental Comments on the Persons Concerned in Them, and Unnecessarily Complete Reports, Perhaps, as to the Part I Myself Played in Them and in Other Related Events.

BY WALTER P. PHILLIPS.

The contention of Mr. Denver that the gold key should have been awarded to me, was one of the few compliments on my sending that had ever been paid me by a man of his high standing, and, naturally, I have cherished his words for more than forty years. All the same I do not agree with him and his stand in my favor has always reminded me of a story that Jacob Tallman used to tell. One night when the boys waxed conversational and the subject under discussion was the great sending stunts of Tip McCloskey, Posey Van Dusen, Cap De Costa and their like, Jake broke in and said: "Let me tell you boys about some great work I did once in Chicago." Everybody smiled and a few winked, but Tallman was a great receiver and though he sent very slowly his telegraphic ability commanded respect. He continued: "I arrived in Chicago on a Monday and they put me on the heaviest circuit in the place — on the Milwaukee wire — to send. Well, the longer I sent the more I got piled up. (Laughter.) Yes, that's right. But the fellow in Milwaukee never broke me and along about four in the afternoon I thought perhaps the wire was grounded and that Milwaukee hadn't been getting me at all, so I said: 'R u tr' and he answered: "Yep, go right ahead; you can't send too slow for me." Mr. Denver is not to be classed with that indolent Milwaukee receiver, but he is enough of a man of the world to appreciate Mr. Tallman's joke. And Mr. Denver is one of those men of affairs, who, like Edmund Clarence Stedman, have a poetic side to their natures. Only in July just passed, he was in evidence at Springfield with a poem which gained him the place of honor with able rhymesters in the persons of James Brewer Corcoran and Samuel Bowles, Jr., as competitors. It was Independence Day. Ex-Governor Long was present, and made one of his admirable addresses, his subject being "A Plea for better citizenship." I give four significant verses of Mr. Denver's poem, and they are indicative of his entire contribution to the metrical pleasures of the day:

The city calls unto its youth,
To-day, as long ago,
When Liberty's bright stars outshone
On field of blue aglow.
And here again, above our hills,
The flag of freedom waves;
It drooped for men of '76,
Yet cheers the patriot graves.

The city calls unto its youth,
For honor, justice, simple truth,
These blessings of the living God—
For which it stands forsooth.
With them, from schoolhouse, dome and spire,
The Stars and Stripes shall thrill,
As echo of brave Warren's voice
Who fell at Bunker Hill.

. . . . . .

The city calls unto its youth
To love their native land,
Acknowledging God's fatherhood
And man's uplifting hand.
What matters creed when pure in heart?
Or land of father's birth?
When faithful here to freedom dear,
Give welcome to our hearth.

. . . . . .

The city calls to youth and age,
From strife and warfare cease,
And urge the martial legions till
The waiting fields of peace.
Then shall the navies' armament,
With merchant flag unfurled,
Proclaim the Holy City's call
Of Joy to all the world.

The time of the tired nocturnal agitators of the brass, and the fresh and talented Kettles, with his evening recreation in the society of the billiard and bowling sharps, ornamented by long visits with his drowsy guardian angel, Morpheus, while his bodyguard of friends and backers kept watch and ward, were as follows:

William R. Plum, New Haven, 6 minutes, 10 seconds.

Patrick H. Burns, Worcester, 6 minutes 11 seconds.

William E. Kettles, Fall River, 6 minutes 15 seconds.

H. S. Shetler, Boston, 6 minutes 51 seconds.

William D. Gentry, New York, 7 minutes 13 seconds.

Walter P. Phillips, Providence, 8 minutes 1 second.

Later, when Burns was long of sleep, he had it out with Kettles, took the gold key and wore it on his vest until his dying day.

Just before this, the latter had been challenged by Gentry to increase the number of words to be transmitted to 500 instead of 250, as before, to which Kettles most graciously consented, and he won, easily beating Gentry more than a minute. Gentry sent at the rate of not more than thirty-six or thirty-seven words per minute. That was his normal gait, and he had no phenomenal links to be let out on special occasions. When he had but 500 words to send he could make no better time than when he had an hour's work, or two, or three before him. I once heard a lady say of the Eighteen-Hour Limited between New York and Chicago, that it must go like a demon. Nothing is further from the fact than that assumption. The train glides on its majestic way at an unvarying rate of speed, and everything keeps out of its way. Steadily, comfortable, and without confusion or excitement this magnificent train makes the time. It was the same way with Gentry, and

probably no sender, unless it were Marks, ever averaged up, night in and night out, to better advantage than this little man, who was no match for Kettles in 250 and 500-word dashes.

Mr. Lincoln once questioned Jesse Bunnell as to whether all operators were as good at a pull as they were at a spurt. It was a singular thing about Gentry that he was better at a pull than he was at a spurt. He would start report promptly at 6 o'clock, New York time, and if, say, only 5,000 words were filed prior to 8:30 p. m., one could count on his having it all sent at that hour if the wire held good and he was not interrupted. So far as he was concerned, there was no occasion to figure on the element of personal equation. He never broke himself, stumbled over his copy or abated his speed, but he was not a fast sender in the sense that Burns and Kettles were. He sent at his top speed all the time, and kept receivers busier, gave them less cause to break and impressed them more deeply as one of the fastest senders in the world than almost any one else had ever done. Marks had the same untiring gait, with the difference that he was night manager of the New York office, and spoke with a tone of command that everybody respected. Any careless receivers who had the temerity to break a couple of times looked out not to do so any more after Marks had indulged in his well-remembered impatient ejaculation, "Wl—wl." Marks would never have won out in a speed test contemplating the sending of a small number of words in competition with men who had attained great speed for short periods, by long and unhalting practice, but as a sender of great numbers of words in a supremely intelligent manner at a rate of speed that kept the receiver spurred up to do his best, he was ideal. Not so many years ago, at one of the national conventions, I was attracted by the speed and spirit with which bulletins were being sent, within earshot, and I moved about and saw that the operator, a total stranger to me, was a good-looking, bald-headed gentlemen, who was letting things go at a jolly rate of speed. When he had cleared for a moment I went over to where he was sitting and said: "I am the General Manager of the United Press, do you happen to know me? My name is Phillips."

"Why, Walter!" exclaimed the old boy with shining face, "sit right down. I want to talk with you as soon as I send this bulletin."

The speaker was W. D. Gentry, and this was our first meeting, excepting as companions on the wire many years before. He had blossomed into a physician, and was taking a turn at the old business, as a favor to his friends of the Western Union, who knew his ability, and particularly needed men of his skill and experience in the particular emergency that is always coincident with the proceedings of a national political convention. It was a joy to hear him send. He was as limber as a boy, and he was wide awake to what he was doing. Dr. Gentry's patients may not have relished his playing truant in these gorgeous days of June, but those were great times for the telegraph when this amiable and capable man came back, temporarily, and shed a benediction upon an art he had once practiced for a livelihood, by merely touching the key with his unpracticed fingers. It was then the music was heard anew and it seemed as if the nervous vibrations that fell so pleasantly upon the ear had been always present, and only inactive because the man, the wire and the occasion had failed, of late, to swing into unison as they were regularly wont to do, in the days of No. 4 East, before the secrets of Galen and the mysteries, known only to his followers, had attracted the alert attention of our bright and able comrade of earlier and less complicated years.

P. V. DE GRAW.
(1874)

RALPH W. POPE
(1864)

WALTER P. PHILLIPS
(1868)

Kettles, besides being marvelously fast, was one of the perfect senders, like Albert E. Sink, William J. Curtis, George W. Conkling, W. L. Waugh, James P. Bradt and others, whose consciences stand in the way of their making phenomenal speed by slighting their work in any way. Burns was a wonder and nothing I have ever heard could equal the speed of his dots, excepting those of Albert S. Ayres

and the Wheatstone automatic. It should be said of Kettles that he unconsciously founded a new school of fast sending and since his advent as a competitor for the gold key, in 1866, every operator who has tried to imitate him has been a blessing to receivers and to the business. He made distinct dashes, his dots were smooth and even, and he was an adept in the art of spacing. We have a sender quite like him in E. C. Boileau, of whom Jesse Bunnell once said, after listening to him for a moment, and not knowing or asking who he was: "If that young fellow didn't dwell so long on his dashes he would be fairly fast." One of the greatest message records that was ever made stands to the credit of Kettles, and he made it over one of those circuits where nothing but firm, even sending carries at all well. As a part of the speed trials of 1868, he was selected by Manager Charles A. Tinker to send through from Washington to Plaister Cove, Cape Breton, one hundred messages of twenty words each. He succeeded in transmitting ninety-four of them in one hour, W. F. Snyder being the receiver. The prevailing impression that Mr. Snyder is a Canadian is erroneous. He was born in Philadelphia, where he began his business career as a messenger for the Magnetic Telegraph Company. His first office was at Magnolia, Md. For more than forty years, however, he has been in the cable service, having entered it at Plaister Cove, in 1867. In 1870, he came to New York, and was in the cable room for a short time, when he was appointed manager at Duxbury, Mass. When the office at Cape Breton was transferred from Plaister Cove to North Sydney, Mr. Snyder became manager at the last named point. His great ability as a telegraph operator has never been overshadowed by his qualifications as a business man. With his great telegraphic talent and numerous others, commercially considered, are combined in him all the qualities that go to prove Pope's proposition that worth makes the man, the want of it the fellow.

Aside from those whose names have been mentioned, there were probably several hundred more who flourished from thirty to forty years ago whose telegrahic ability was of the very first quality. Prominent among them—I give the names alphabetically—were: James B. Austin, A. H. Babb, Fred W. Baldwin, William M. Benett, Charles F. Benett ("Dad"), Thomas J. Bishop, Willis J. Cook, M. H. Crane, Thomas A. Davin, Charles H. Davis, William J. Dealy, P. V. DeGraw, George M. Eitemiller, Charles H. Erwin, Robert Ewing, Wilfred N. Gove, Jules Guthridge, George Hamilton, Dennis Harmon, William A. Harris, C. W. Henderson, George E. Hinman, George Kennan, John Lapey, Joseph W. Larish, Edward A. Leslie, B. F. Lloyd, William J. Lloyd, William T. Loper, Robert B. Lown, I. D. Maize, Morrell Marean, Robert W. Martin, Curtis Meserve, Charles H. Mixer, Robert Morton, Frank J. Mulcahy, H. J. Pettingill, William H. Sawyer, Watson D. Schram, Henry V. Shelley, Henry Stanberry, M. J. Sullivan, John B. Taltavall, Thomas R. Taltavall, Charles Thayer, John R. Van Wormer, and Harry A. Wells. Of the women telegraphers, I have known but few who had the endurance of men. Many have developed great skill, but the physical requirements on heavy press circuits have been too severe to be borne by women for extended periods. The notable exceptions have been Mary J. Macaulay, Beda L. Arnold, Margaret Flood, Mrs. John Mitchell (Minnie Swan), Ella A. Hitchcock and Alice Callan, all of whom were in the service of the United Press (No. 1) and did a man's work each. I am proud to say also that they were paid men's salaries.

WILLIAM H. ALLEN
(1865)

PRESTON J. HURLBURT
(1865)

ALBERT L. SUESMAN
(1873)

(To be continued.)

Between the Lines.

"Can't" is the "won't" of people who don't.

Buy what you don't want and you'll sell what you can't spare.

Ninety-nine out of a hundred men are not worth buying. The hundredth won't sell himself.

It is better to know that you think than to think that you know.—South African Railway Magazine.

Submarine Telegraphy.*

BY CHARLES BRIGHT, F.R.S.E., M.I.E.E.

It might well be thought that the art of telegraphing under the sea was a subject that was confined to the electrical methods adopted for carrying on communication; but before establishing our communication, we must make and lay our cable, to convey the electric current. I therefore, propose to first present to you a general idea of the theory and practice of transmitting electric signals such as go to form messages.

The desire for communicating with our fellow beings at a distance received considerable encouragement from the early discoveries in electrical phenomena, which—together with the invention of the voltaic cell—gradually led to a practical electric telegraph.

The principle of all telegraph instruments is dependent upon the telegraph alphabet introduced by Professor Morse for the purpose, where different letters are represented by different combinations of sound clicks, as in the sounder, or in that of ink marks on paper, as in the Morse recorder.

The simplicity and economy of the sounder and such like for village telegraph offices, and the reliability of the Morse recorder and such like for more important circuits, have been sufficient to maintain the use of the apparatus I have described, except where greater speeds are a special requirement. The objection to this system is, however, the long—in contra-distinction to the short—periods which go to form the alphabet. This is comparatively immaterial for the bare iron wires supported on insulators which constitute our ordinary overland telegraphs. But where the conditions demand insulated wires—whether overhead, underground or submarine—it is desirable to achieve a greater speed of working than is possible by this system; and the method adopted is to substitute for the long periods a current in the reverse direction.

In ordinary telegraph practice we very generally employ a few Leclanché or other voltaic cells, the number varying from five to one hundred, according to the length, type and condition of the line. Accumulators are also much used, and so are dry cells.

When a current of electricity is passed through a cable by connection with a battery of the description I have named, the insulated conductor, having a certain electrical resistance and a certain electrostatic capacity, what is known as electric retardation takes place. This tends to check the complete charging or discharging of a cable spontaneously.

In the year 1867, the then Sir William Thomson (afterwards Lord Kelvin) introduced what is known as the siphon recorder for receiving signals through more or less lengths of cable, and this is now in general use, one of its main advantages over previous apparatus being that it supplies a record of the signals as received.

This instrument consists of a light coil of wire vertically suspended in the field of a permanent steel magnet.

Attached to the coil is a light glass siphon, one end of which dips into an ink vessel, the other hanging over a continuous strip of paper drawn along by an electric motor. Thus every deflection of the suspended coil, actuated by a current passing through it, is recorded by a horizontal ink line of certain direction and length across the slip.

At the transmitting end, the current is conveyed into the cable by manipulating a key, which, by the depression of one or other of the tapping levers, connects one or other pole of the battery with the end of the cable, thereby sending a current in one direction or the other—or, to put it in another way, sending either a positive or negative current as the case may be—the result being a deflection of the suspended coil at the further end in one direction or the other.

The rapid manipulation of these keys has become such a fine art that a speed of thirty-five words a minute can be attained successfully by experienced operators.

With this system the Morse alphabet is turned to account. It might naturally be supposed that great difficulty would be experienced in deciphering such a language. Skilled clerks, however, can make out almost anything in these snake-like movements

Duplex telegraphy, first applied to cables in 1870, is a system in which the output is nearly doubled, by sending and receiving messages from both ends at one and the same time. This system is adopted on all lines with a sufficiently large traffic to warrant application, thereby tending to save the cost of an additional cable. The general principle of duplex working is that—by means of resistances and capacities corresponding to that of the cable itself—artificial establishment of an exact electrical balance at each end of the line is secured under normal conditions. This balance is, then, only upset in accordance with the transmission of signals, thus permitting these to be despatched and received from either end at the same moment. The application of condensers at each end of the line, as well as other methods for curbing the current, also tend towards increased speed and greater clearness of signals. Thus, an Atlantic cable of to-day designed to give a speed of fifty words per minute, will practically work at a speed of 100 words a minute on the duplex system in conjunction with automatic machine transmission.

Even the most proficient telegrapher can scarcely manipulate the transmitting key at a higher rate than thirty-five words a minute; but the automatic transmitter is capable of practically any speed; and the receiving apparatus is now-

*Abstract of lecture delivered before the Royal Institution.

adays almost limitless in its capacity. So much so, that it is really only the line itself which governs the speed of an important ocean cable; and the electrical proportions of this can—within certain limits—be made practically anything in accordance with traffic requirements. Thus, it will be seen that wireless telegraphy has something to compete with in the way of output. It should here be added that the working speed of a cable is dependent on its length. It is, in fact, inversely proportional to the square of that length; and it is for this reason that we have to provide a very much larger conductor and insulator for long than for short cables, if we want to get the same high speed.

With a view to effecting automatic, instead of manual, translation between lengths of submarine line, the cable relay may be said to have been the dream of the cable manager for years, and one that has seriously occupied the minds of many an electrician. Only comparatively recently, however, has complete success in this direction been achieved.

The practical effect of submarine telegraphy is further achieved by the code and cipher system, whereby a number of words are represented, in secrecy, by a single word or combination of figures. To take an example, the word "Elgin" in a certain mercantile code stands for as much as "Every article is of good quality that we have shipped to you."

On account of its marked superiority, electrically to all metals except silver, which is too expensive, the wire used as a conductor has always been composed of the purest possible copper. The first Atlantic cable had a conductivity only about half of what a similar cable of the present day boasts; this is due to the greater purity of manufactured copper, which now, indeed, exceeds that of the old standard for pure copper.

A solid wire being unsuitable mechanically, the conductor takes the form of several—usually six—wires laid up, or stranded, together round a central wire. The size of these wires varies with the electrical requirements, being mainly dependent on the length of the line involved; and in very long cables—such as those spanning the Atlantic and Pacific oceans—the central wire is usually of a larger gauge in order to more effectively meet prevailing conditions.

Water — and especially salt water — being a good conductor of electricity, the copper conductor requires to be covered with some substance which is a good insulating medium, to prevent the transmitted current returning the shortest way to earth instead of going to the further end of the lines; and the history of submarine telegraphy may, for practical purposes, be said to have started with the introduction of a suitable insulator. Previously, a number of substances — including tarred cotton, glass tubes steeped in pitch, etc.—has been experimented with for underground wires as well as for subaqueous conductors across canals and rivers.

In the case of a landline, insulation is effected more or less easily by supporting the wire on insulators at certain intervals; but with a wire laid under water, no such easy means of confining the current is possible and every inch of the wire has to be insulated.

Professor Wheatstone (afterwards Sir Charles Wheatstone)—originally a music-seller—is said to have been actually engaged for three years, from 1837 to 1840, on a method of insulation for a proposed cable across the Straits of Dover. In the latter year, however, Faraday and Werner Siemens independently pointed to the insulating properties of gutta percha; and india rubber was suggested as an electrical insulator about the same time.

To Morse we must certainly give the credit for first using a wire covered with the latter material for transmitting signals under water. At this time the great American inventor was suffering from most dire poverty; and we find him writing: "I am crushed for want of means. My hat is hoary with age, and my stockings all want to see my mother." Nevertheless, he succeeeded in proving the utility of india rubber covered wire for signaling across rivers.

Owing largely to the greater difficulty in satisfactory mechanical manipulation—though much used for underground work, for which gutta percha is unsuited—india rubber is comparatively little employed for covering submarine wires, except under special circumstances.

The covering of the conductor with suitable insulation is, perhaps, the most important feature in the construction of a submarine telegraph, for so much depends on it; moreover, the cost of the insulating material forms the largest, as well as most variable, item in the entire line.

Once the conducting wire is satisfactorily insulated nothing else would be required but for the necessity for mechanical protection at the sea bottom, and also to meet the requirements of subsequent recovery when repairs are found to be necessary.

The mechanical protection and strength of submarine telegraph has—more or less from the start—taken the form of a close sheathing of galvanized iron wires similar to pit ropes. It was at once recognized, however, that if these wires were applied direct on the outside of the core, the insulation would be likely to suffer mechanically, and therefore, the line would soon become electrically unsound. To meet this objection the core is enveloped in a close packing of several jute yarns. These are applied by a machine on the same principle as that for laying up the copper strands.

As in the case of the conductor and the jute serving, the iron wires are applied helically in accordance with mechanical requirements, by a machine of precisely the same character as that employed for laying up wire ropes.

For the deep sea portion of a line the wires are nowadays usually composed of steel—with a

breaking strain of over one hundred tons per square inch—the object being longitudinal strength; whereas that for the heavy shore end types is composed of soft iron, but of a much larger gauge for the purpose of weight (combined with flexibility), in order to cope with anchors, rocks, tides, etc. The galvanizing of iron wires is not a complete preservative against rust in salt water; and, mainly for this reason, the sheathing is coated with a mixture of mineral pitch, tar and silica, which is again applied after the cable has been enveloped in an outer serving of hemp, or canvas tape, acting as a firm binding and a further preservative.

During the whole course of manufacture the cable is kept under a continuous electrical test; and the instruments employed therein are similar in principle to those used in the subsequent electrical working of the line.

About thirty-five miles is an average output of cable made at a cable factory in an ordinary working day—varying, however, with the number of machines available. Thus, as a rule, it takes from two to three months to make an Atlantic cable.

Deep-sea cable—for three or four-mile depths—will bear a strain of seven tons; and—its weight being only about one ton per mile in water—it is capable of supporting a considerable length of itself, when in good condition. Thus, such a cable can be recovered and repaired in great depths in the event of an electrical fault.

At one time this form of iron sheathing was called into question; and opinions were ventilated very similar to those in the middle ages about soldier's armor. It was said that when the cable had to be picked up, they would have a gutta percha core pulling up a loose sheathing, instead of the sheathing pulling up the cable. The position was likened to a man being knocked down in a suit of armor, and not being able to get up again until it was loosened. Thus, various other types of cable—some, without any iron wires, entirely dependent on hemp for their strength—have been introduced from time to time.

Such cables, however, though certainly possessing the advantage of lightness, have not proved successful in practice, and never received serious encouragement. In a type which was adopted in one or two lines—notably in the second Atlantic cable, each sheathing wire was enveloped in hemp with a view to reducing the weight, but the hemp was soon destroyed by the rusted iron wires which then remained in a loose bundle.

It is, indeed, a remarkable fact—peculiar in engineering—that though steady advance has been made in details, and especially in the quality of the materials used, the general type of cable is practically the same as was first determined on for the earliest lines.

Having now dealt as far as possible with the construction of a submarine cable, I will pass on to the laying of it. Strictly speaking, the manufacture should not be embarked on until a survey of the route has been effected for determining the types to be adopted and the length of the same. In any case such a survey is essential before the actual laying takes place.

All deep water soundings are nowadays effected by means of very fine, but intensely strong, steel wire of the type employed in the treble notes of a piano, bearing a strain equivalent to 130 tons per square inch. With such a wire, and a suitable weight attached thereto, the depth is ascertained by noting the length which runs out before bottom is struck. The employment of this system enables soundings to be taken with far greater accuracy and despatch than was possible with a stout hempen line, as used in former days.

Besides measuring the depth, it is usual—by means of small metallic tubes attached to the line—to secure a specimen of the bottom; and occasionally, with the aid of a suitable thermometer, to ascertain the temperature, this also being a matter of some importance—partly in revealing the possible presence of any hot springs.

By far the most complete surveys of the ocean floor have been effected as the result of submarine cable enterprise rather than by the naval authorities of any country. This, however, is only natural; for, with the former, a thorough survey often means the difference between heavy commercial loss and complete and lasting success.

With small repairing ships there is often no stern gear, any necessary laying work during repairs being effected by means of the bow machinery. Indeed, the picking up gear is frequently used for paying out a short length even on large vessels, to save the operation of passing the cable along to the stern after splicing on to a buoyed end.

The evils of laying a cable without a proper knowledge of the contour of the sea bottom have already been dealt with; but it is almost equally bad to lay a cable without properly providing for such irregularities as are unavoidable.

This provision takes the form of laying what is known as slack cable where necessary; that is, extra cable to fill up the irregularities, thereby avoiding suspension from point to point. This involves a due regulation of the line in its egress from the ship, in proportion to the speed of the vessel overground; and that is secured by apparatus between the cable tank and the stern of the vessel. This machinery was originally introduced by my father, the late Sir Charles Bright, for laying the first Atlantic cable.

Round a drum, the cable, on its way from the tank, takes several turns before passing on to a sheave towards the stern of the ship. The speed at which the cable passes outboard is controlled by the speed of this drum. On the same shaft there are two other drums.

These latter drums run through a circular friction strap, which is tightened or loosened as required, by altering the weight at the end of a lever.

As the depth varies, it becomes necessary to alter this strain by adjusting the weight on the brakes in order to pay out the amount of cable required for the irregularities of the bottom. It is obvious that this must always be in excess of the distance run by the ship overground, which might be seven miles to eight miles of cable.

On a given line, the average surplus cable laid to provide for the aforesaid irregularities of the bottom amounts to something like ten per cent. of the length. Thus, taking the distance across the North Atlantic Ocean at about 2,000 miles, the cable actually laid will amount to 2,200 miles. On this basis, and by continuous work day and night, it takes three weeks to lay an Atlantic cable under favorable conditions as to weather.

While the egress of the cable is being looked after by the engineers on deck, its electrical health is being carefully tended by the electricians in the testing room, who are in continuous communication with those at the cable testing hut on shore, where the paying out vessel has laid the line from. This takes the form of sending certain prearranged signals at certain prearranged intervals of time, accompanied by occasional interchange of remarks. If anything goes wrong—such as the cable actually breaking under a strain, or the gutta percha insulation failing under the extreme pressure of the ocean—the electricians know of it at once; and their first duty is to give notice to the engineer-in-charge, with a view to the ship being stopped and laying operations suspended.

The skill of electricians in this most important work has been brought to a very high pitch; and, under favorable conditions, a fault can often be localized even to within a few feet. Under less favorable circumstances, and on long lengths of cable, where tests may be seriously interfered with by earth currents, localization is sometimes very difficult, though a fault is frequently located within a quarter of a mile in a total length of 1,000 miles.

Assuming that all goes well, cable laying would be continued until reaching a point a few miles from the other shore, when the cable would be cut and buoyed, preparatory to landing it there. As a rule, however, the shore end has been previously landed by a smaller ship entirely occupied with this work; so that, in that case, the big vessel that has laid the main cable would approach the buoyed end of this cable.

As it would be impossible to haul a heavy cable ashore along the bed of the sea, it has to be floated ashore on the surface; and this is usually done by barrels being attached to it at intervals.

The eventualities of a submarine cable are many. It may be torn by an anchor, crushed by a rock or seriously damaged by a coral reef, such as abound in the tropics. Some of the growths often found on a cable tend to gradually decay the iron sheathing wires. Then, again, a cable is sometimes severed by a seaquake.

But the little animal that makes itself most objectionable from the cable engineer's standpoint, is the insignificant-looking teredo navalis. This little beast is intensely greedy where gutta percha is concerned, working its way there between the iron wires and between the serving yarns. The silica in the outer cable compound tends to defeat the teredo's efforts at making a meal off the core; and this defeat is further effected by the served core being enveloped in a thin taping of brass—applied spirally during the inner serving operation, and in a similar manner. But where the bottom is known to be badly infected with these little monsters of the deep, the insulator is often composed of india rubber, which has no attractions for the teredo, and possesses a toughness, moreover, which is less suited for its boring tool than the comparatively cheese-like gutta percha.

We see then that, from one cause or another, faults occur in most cables from time to time. These require to be electrically localized from the cable testing hut, on principles already briefly alluded to; and a ship sent out to the supposed position to grapple for the line, pick it up and effect the necessary repairs.

The line to which the grapnel is attached is composed of strands of steel and hemp combined, and bears a strain of as much as twenty tons. There are also several other forms of grapnel. Some of these grapnels have aprons to prevent the prongs becoming engaged with rocks.

When the cable has really been hooked and picked up—an operation which may entail several weeks, or even months, if only in waiting for favorable weather—the bight is secured at the bows and afterwards cut. Each end is then brought on board alternately, and tested electrically. If found to be sound, the necessary repairs are then effected.

The "Colonia" is the latest of the big telegraph ships, having—with her sister-ship, the "Anglia"—entirely outstripped all others in size and every other respect. This vessel, and the "Anglia," were built for the laying of the All-British Pacific cable, which they laid in the year 1902 with complete success. With a length of 500 feet and a carrying capacity of 11,000 tons, either of them would be capable of laying an entire Atlantic cable with the assistance of a smaller vessel for landing the shore ends.

The telegraph ship "Silvertown," built in 1873, comes next in size and carrying capacity. Her beam is fifty-six feet, and she is capable of carrying 8,000 tons, though her length is not considerable.

The "Faraday" was built a year later. This vessel is of special interest owing to her design—due to that distinguished man, the late Sir William Siemens.

(To be continued.)

The Military Telegrapher in the Civil War.

PART XXIX.

Wayne H. Parsons, who served in the military telegraph service during a greater part of the Civil War and who died at Watertown, N. Y., September 3, 1898, while living at Batavia, N. Y., in 1878, in a letter which was addressed to Colonel William R. Plum, historian of the United States Military Telegraph Corps, wrote in part as follows concerning his experiences as a military telegrapher:

"In October, 1861, I joined the United States Military Telegraph Corps at St. Louis, Mo., it then being in command of Major George H. Smith. General John C. Fremont, then in command of all troops west of the Mississippi River, sought to organize a telegraph corps of commissioned and non-commissioned officers and privates in the direct service of the government and to that end corresponded with headquarters at Washington, but his plan was overruled. On the 18th of October I was ordered to active field duty as telegraph and cipher operator at Tipton, Mo., which place was an important point at this time, remaining as it did for several weeks the end of the circuit from headquarters at St. Louis. All important movements were directed by telegraph, and the position was one of responsibility. The Tipton end of the wire was the point toward which all eyes were turned for news from the army of volunteers west of the Mississippi. F. S. Van Valkenburg was then acting as one of Major Smith's assistants in the field and was detailed for duty in this department.

"It was at Tipton that the writer first met S. L. Griffin, a telegraph operator of no mean ability, then a private with a musket on his shoulder, and was instrumental in securing for him a detail to the telegraph service, in which he afterwards did excellent work.

"After remaining at Tipton some five months I applied for and obtained from Major Smith orders to go to St. Louis and thence to the front in Tennessee, where more active operations were going on. Leaving St. Louis by boat on the 3d of April, 1862, we proceeded to Cairo, thence to Paducah and up the Tennessee River to Savannah, Tenn., at which point General Grant, then in command of the army of the Tennessee, had his headquarters. After the boat had left Paducah and supposing that I was the only operator on board, what was my astonishment and delight to find that another knight of the key was also aboard bound on the same mission and with the same orders, i. e., to report to General Grant at Savannah. This operator was L. D. Parker. We arrived at Savannah on the 6th of April, 1862. At the first break of day the heavy booming of artillery was heard from the direction of Pittsburg Landing, nine miles up the river. Parker and myself lost no time in reporting to General Grant for duty, and he ordered that we proceed with himself and staff to the scene of conflict. The steamboat Tigress was immediately made ready and we were soon started up the river, arriving at the landing about 9 a. m. Men were at that time at work putting up a line from Nashville to Savannah, which not being completed, we had no telegraphic communication with the outside world. In the afternoon of Monday, the 7th, however, we received word that this line was nearly completed and lost no time in returning to Savannah to be in readiness for business. About 3 p. m. of the 7th, just as the Confederate lines were breaking in utter confusion, and it was known that victory was ours, we boarded a transport and were soon back at Savannah. The linemen were stringing the wire through the streets as we arrived and in a short time we had our office opened in the front of a store which was filled with wounded soldiers. We soon established telegraphic communication with Nashville and thence with the north, and messages of the wounded, the dead and the living came pouring in upon us by the hundred.

"I was ordered to General Pope's headquarters a few days after the battle of Pittsburg Landing. General Pope's brigade occupied the extreme left of the Federal line and rested on the Memphis and Charleston Railroad, there occupied and operated by the Confederates. While the seige was in progress, General Pope received orders to make a reconnoissance across a swamp from his position to Farmington, a small town four miles from Corinth. I was detailed to go with the advance, Solomon Palmer and his linemen putting up a temporary wire as the miners and sappers advanced. We were in telegraphic communication with the headquarters by the time the main body of the force had fairly gained a footing on the opposite side of the swamp. L. B. Spellman and Alvah S. Hawkins were at this time on duty at General Pope's headquarters and F. S. Van Valkenburg was on special cipher duty in the field and also accompanied this expedition. The telegraph corps had a special escort of one company of cavalry. We found the Confederate camp fires still smouldering, but no enemy in sight.

"One brigade was left to hold the position while the rest of the force returned to the main camp. The next morning we were attacked by the Confederates and upon asking General Pope for instructions, I was told to remain where I was as long as I could in order to keep him informed of the movements of the enemy. They soon opened fire upon the house where I had located my office and hastily notifying the General of the fact, I picked up my instrument, mounted a horse and began my retreat. Going back to the edge of the swamp, I again connected my instrument to the wire and reported the condition of affairs to General Pope. The Confederates, however, soon found the range of the spot where I stopped and I was compelled to retreat again, this time without my instrument. Arriving at General Pope's headquarters about 4 p. m., I was surprised to

learn that the General had not believed the reports which I had sent from the outlying position, but had told the operators that I must be scared and he would place me under arrest. The report of General Buford, who had command of the forces which were attacked, convinced General Pope that I done my duty and he afterwards praised me for the same.

"When Corinth was finally evacuated by the Confederates, the corps of telegraph operators and linemen were among the first to enter the town and the house of the Confederate General Williams was set aside as our office. The Confederate lines were soon repaired as our armies advanced to the point on the different lines of railroad and in a few days we were in communication with Cairo by way of Jackson, Columbus and Memphis. The office at Corinth was an important one for some time, there being fifteen or twenty operators employed there at once. I was detailed to report to General Osterhous at Rienzi, seventeen miles south of Corinth. Soon after his brigade was sent to Sikeston, Mo., in the midst of the New Madrid swamps. After being here two weeks I was taken sick and ordered to the hospital at Mound City.

"Upon my recovery I was assigned to the Cairo office, which was then in charge of Mr. W. L. Gross. After some time at that place I received orders to report at Grand Junction, N. C., which was an important telegraphic center. During a portion of my stay there Alvah S. Hawkins, William Foley and several other operators were with me. In February, 1863, I was left alone in charge of that office as the other operators had been transferred to other points. I remained there until April, 1863, when I was transferred to Jackson, Tenn., from which point I was ordered to Memphis, May 24, to report at General Hurlburt's headquarters in that city. I remained there only a short time, however, when I was sent to Vicksburg. Upon my arrival there I was sent to Chickasaw Bayou, to relieve Operator M. K. Booth, who was sick. Upon his return I was ordered to General Lattman's headquarters, where I remained until the surrender of Vicksburg, July 4, when I entered the city. July 7 telegraphic communication into Vicksburg from outside points was opened up. Among the operators who were in the city at that time were J. C. Sullivan, Samuel Beckwith, J. O. Ingle, G. W. Baxter, D. H. Johnson and others. July 13 I was ordered to report at General Sherman's headquarters at Big Black, which was about eight miles east of Vicksburg. He was in pursuit of General Joseph Johnston, who was retreating toward Jackson, Miss. Accompanied by J. O. Ingle, I made my way as best I could after General Sherman, arriving the next day at Clinton, where we found that an office had been opened with Stephen Robinson in charge. That evening Solomon Palmer, returning to Clinton, reported that General Sherman had established headquarters at Jackson, and that the wire had been connected to that point. We accordingly continued our way and arrived at Jackson the next day, where we found plenty of business awaiting us. I remained at General Sherman's headquarters until September 22, when, upon receiving a letter from my mother, who was living at Utica, N. Y., asking me to come home as her health was very poor, I applied to General Sherman to be relieved. Under the circumstances he allowed me to go.

"I was detained at Memphis, however, waiting for my back pay and in the meantime General Rosecrans, having been driven back by the Confederates at Stone River, General Sherman had received orders to immediately transport his army to Memphis and thence make a forced march across the country to Chattanooga, Tenn. He arriving at Memphis before I departed, learned that I was still in that city and prevailed upon me to accompany him on this expedition. I went as far as La Grange, where I found Robert Fowler employed as operator. I remained there until October 26, when I was ordered to Iuka, where General Sherman had established temporary headquarters. When we arrived at Florence, Ala., I was ordered to go to Decherd, a station on the Nashville and Stevenson Railroad, seventy-five miles distant. Accompanied by the third regular cavalry as guard, I left Elk River about 3 p. m., November 30, and after a tiresome and perilous ride through a country which was infested with bushwhackers, we arrived at our destination about dark the next day. I found James Lowe in charge of the office at that point, and after sending our despatches to General Grant at Chattanooga and obtaining answers thereto, we started the next morning upon our return to the main army, which we met at Fayetteville that afternoon at 3 p. m. When Sherman finally joined Grant and the battle of Lookout Mountain resulted from their combined efforts, I acted as cipher operator in the field on the day of that battle and was under fire nearly all of the time. After the battle General Sherman ordered me to proceed to Chattanooga and from there build a line to Chickamauga with all possible speed. There being no line builders in Chattanooga then I secured a detail of sharp shooters and started building the line. General Sherman being ordered to proceed toward Knoxville after General Longstreet, this line was not necessary, and we returned to Chattanooga. I remained in the office here for some time, finding among other operators at this place Jesse H. Bunnell, William Patterson, M. C. Baldwin and W. H. Miller. I afterwards worked in the offices at Bridgeport, Stevenson and Scottsboro, Ala. January 6, 1864, I was relieved at the latter place by R. B. Lines. From there I went to Pittsville, where I relieved John Lonergan, who was in charge of the office there. In March, 1864, I was ordered to Nashville, where I filled the position of chief operator for several months, when I resigned and started home, thus ending my connection with the military telegraph service."

Telegraph and Telephone Systems as Affected by Alternating-Current Lines.*

BY J. B. TAYLOR.

In the early days of the electrical industry the telegraph practically had the field to itself. The telephone and electric light were introduced at about the same time, and later on the alternating-current systems gradually came into general use for lighting, general power, and railway purposes. At the outset, the telegraph systems made use of earth return and continue to do so at the present day. The telephone systems started out using an earth return, but soon found that satisfactory service, except in isolated cases, could be obtained only with metallic circuits. The power systems (this term includes alternating-current systems whether used for lighting, for power or for railway purposes) have until recently almost invariably used metallic circuits, which, when properly installed and under normal conditions, cause little interference to telegraph and telephone lines. Abnormal conditions, however, such as grounds, open circuits, and the like, upset the normal balance, giving strong external fields, both electrostatic and electromagnetic, which are likely to make trouble for sensitive systems in the immediate neighborhood. Recently the single-phase railway system has come into prominence. With this system the conditions are continuously very similar to those conditions which exist occasionally but of short duration on the power systems.

The great increase in the transmission industry means that power circuits are continually becoming longer, voltages higher, and the amount of energy transmitted greater with more or less corresponding increase in disturbance to the weaker brothers. Steam railroads have in many cases presented the most natural and logical right of way for pole lines, with the result that power wires and signaling lines are likely to be in proximity.

The telegraph, telephone and power systems, while rendering different classes of service, are all essential to present methods of living and carrying on business. The purpose of this paper is to give a general statement of power transmission and telegraph and telephone conditions as they exist, with special reference to combinations which may make trouble if simultaneous operation is attempted in too close proximity.

It should be borne in mind that induction between circuits is a mutual affair, the principle distinction being that a high-voltage transmission line conveying perhaps 1,000 to 5,000 kilowatts is not disturbed by, nor even able to detect, a few extra volts derived by induction from a telegraph line on the other side of the highway. The converse of this proposition is by no means true, and this points to the desirability of power transmission systems doing everything possible to keep the stresses and strains in the ether within the boundaries of their own right-of-way, and the equal importance of telegraph and telephone apparatus and lines being so constructed and maintained that they will be as far as possible independent of stresses and strains which may be unavoidably introduced into the portion of the ether which they occupy. An adequate consideration and solution of the problem necessarily involves an intimate study of the characteristics and sensibilities of telephone and telegraph instruments as well as a calculation of disturbing electromotive forces and currents induced in their circuits with values depending upon all the various features of construction and operation of the power lines.

The telegraph circuit, with few exceptions, is made up of a single wire and earth return. Relays are usually of 150 ohms resistance and the normal working current is in the neighborhood of forty milliamperes, although many circuits having a large number of intermediate stations make use of 37.5 or thirty-five ohm relays and on these circuits the current will probably average nearer fifty than forty milliamperes.

The duplex system ordinarily uses current of twelve to fifteen milliamperes and the quadruplex uses three to four times this current, say, thirty-five to fifty milliamperes, for actuating the neutral relay.

As far as the main line current is concerned, these two systems include nearly all of the various types of high-speed, automatic printing telegraphs, etc., the main difference being in the types of relays and local apparatus controlled by them, as well as the duration and polarity of signals and the code used. For example, the Rowland system recently described in an Institute paper, is essentially a duplex system, the octoplex capacity being obtained by assigning the line for short intervals of time to one of the four operators at each end in succession.

The frequency of the currents for hand-transmission probably averages in the neighborhood of eight to ten cycles, although this is a crude way of putting the matter, as signals are short and long interspersed with spaces. The Wheatstone automatic system, when working up to an extreme speed of 600 words per minute, gives alternate pulses in the line corresponding roughly to 240 cycles per second. The Rowland system as described uses approximately one hundred cycles for octoplex working and fifty cycles for quadruplex working. The inertia of the armature of the standard one hundred and fifty-ohm relay, and other features of its magnetic design, will not permit this relay to follow very rapid alternations so that on the high-speed, automatic-working, special constructions of the Siemens or Wheatstone type are used.

All relays are provided with ready means for adjusting the air-gap, length of stroke, and tension of retractile spring, where such is used. Any data on the sensibility of relays are therefore greatly dependent on these various adjustments. Furthermore, adjustments are continually being made by the operators to compensate for variable leakage of the

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line, due to weather conditions, and also to compensate for variable current and lag, depending on relative positions on the line of sending and receiving operators. It is therefore impossible to make a general statement that a certain number of milliamperes added to or subtracted from the normal direct current, due to inductive influence, will disturb or completely upset the working, and that a lesser superimposed current will not be felt.

Experienced operators recognize their friends by the way the instrument "talks," quite as distinctly as those who are not operators recognize handwriting or the sound of the voice. This is stated to bring out the point that disturbances on the line which do not actually upset the working may make considerable difference in the comfort or state of mind in which the operator does his work.

In order to give some idea of the characteristics of the standard 150-ohm relay, tests have been made under the following adjustments:

Magnetic air-gap, 0.07 inch.

Length of stroke at contacts 0.015 inch.

Spring tension so that relay would pick up at forty milliamperes direct current, and let go at thirty milliamperes.

Under these conditions, twenty-five cycles alternating-current current to cause relay to chatter on the back stop, thirty-one milliamperes.

Current to cause relay to pull up to front stop sufficient to start chattering in local sounder, sixty-two miliamperes.

With forty milliamperes direct current in relay—superimposed twenty-five cycle current to cause relay to break contact on the front stop, twenty milliamperes.

As stated, different adjustment of gap, length of stroke, and spring tension would give quite a different set of current values.

The impedance of a standard 150-ohm relay at twenty-five cycles is given herewith at different air-gaps:

Air Gap.	Impedance.	25-cycle current when measuring impedance.
0.12 inch	465 ohm	89 milliamperes
0.11 "	474 "	88 "
0.10 "	488 "	86 "
0.08 "	515 "	82 "
0.06 "	555 "	77 "
0.05 "	580 "	74 "
0.04 "	650 "	67 "
0.03 "	725 "	61 "

Where a telegraph disturbance is slight, improvement may be effected by one or more of the following devices:

Increasing impedance of line.

Increasing working current.

Shunting apparatus with condensers or non-inductive resistance.

Placing short-circuited secondary winding on relay.

Placing neutralizing winding on relay.

Using back contact of relay with reversing sounder.

By placing addtional resistance and reactance in the telegraph circuit, the superimposed alternating currents will be reduced in proportion to the increase of impedance. At the same time the battery should be increased to maintain the normal direct current, at its usual value. By working the line at a higher value of direct current, the percentage increase and decrease due to induced alternating currents will be less, with consequent reduction in the disturbance of the relay. Shunting the relay with a condenser or a non-inductive resistance diverts a portion of the alternating current from the inductive winding of the relay. While a condenser bridging a single relay will help this particular instrument, it will not help the line as a whole. By placing the relay winding over a thick copper tube or on a copper spool, alternating currents will be induced in the copper tube which will tend to oppose the effect of the alternating current in the winding.

In the second winding of a differential relay, currents in opposite direction to the alternating currents in the main winding may be introduced by means of a small transformer.

Since the signaling currents in a telegraph line are of the nature of alternating currents, it can be seen that any of the above choking, shunting, absorbing or neutralizing devices will tend to make the action of the relays sluggish; and as soon as the frequency of the signaling currents equals or exceeds that of the induced currents, these devices will become a hindrance rather than a help.

When the telegraph line is open, the relays are against their back stops; and with the line open, there would be no current, either direct or alternating, except for leakage and capacity effects. The air-gap is also at its greatest, so that the relay is less likely to be disturbed while on the back contact than when on the forward contact. By taking the local circuit from a back contact on the relay, and adding a reversing sounder the inductive disturbance may be less noticeable. This is a combination known as a "bug-trap," having been devised by Mr. Edison in the early days of the quadruplex. It is also possible to accomplish a similar result by using a flexible or spring contact on the relay. Such a contact allows a slight vibration of the armature without causing the local circuit to open.

The devices just considered are only palliative remedies. When the amount of power transmitted, length of line, or small separation of the two circuits is such as to make the disturbance severe, definite neutralizing conditions must be introduced.

If we can introduce into a telegraph circuit voltages equal and opposite to those derived by electromagnetic induction, and at the same time supply to the line the charge demanded by electrostatic induction, we shall succeed in neutralizing the inductive effects. Current transformers connected in a disturbing wire introduce into the telegraph line a voltage proportional to the current in the transformer. Since on a railway the position of the load is shifting, it would be necessary to divide the line

into sections, with a transformer for each. The shorter the sections, the more exact the neutralization. Electrostatic induction is neutralized by using condensers in connection with potential transformers. The proper charge can be obtained by varying the capacity of the condensers or the voltage applied to them.

Instead of using current derived directly from the disturbing wire for the purpose of neutralizing, the neutralizing current may be derived from a special neutralizing wire placed close to the disturbed telegraph wires. Since the neutralizing wire has practically the same exposure as the telegraph wire, the same voltage may be induced in each, and a suitable 1:1 transformer makes proper change of polarity so that voltage induced directly in the telegraph wire is annuled by that induced in the neutralizing wire. This arrangement while effective is not exact, on account of magnetizing currents, earth currents, phase distortion, and the like.

In spite of all of the arrangements of alternating-current circuits which may be employed to eliminate or reduce disturbing inductive effects, in some situations it may be cheaper or more desirable to make use of a metallic circuit for the telegraph. Any form of metallic circuit telegraph will be less sensitive than a circuit with earth return, but the full benefit of the metallic circuit is to be derived only when following the "balancing" principles to be stated more in detail in discussing the telephone.

The metallic telegraph may be operated on either the series or multiple connection, and either of these connections properly installed will be perfectly balanced. The same might be said of the telephone system, although as far as the writer is aware a balanced metallic series telephone system has never been used.

Inductively considered, corresponding points on the two wires of a telephone or metallic circuit telegraph system are at the same potential. Slight differences in potential due to the difference of field strength in the ten or twelve inches separating two wires in practice is made insignificant by frequent transpositions, and small charging currents must flow back and forth from one section to another, due to the slight difference of potential between the two wires. Pieces of apparatus such as telephone receivers, bells, or telegraph relays, "bridged" between the two wires are, therefore, free from inductive currents. If the apparatus be connected in series, in order to preserve the balance it must be differentially wound, an equal winding being cut into each side of the line. With such an arrangement, on account of the differential action of the two windings, induced currents or electrostatic charges flowing from one section of the line to another section will not affect the instrument.

(To be continued.)

Concrete Telegraph Poles.

G. A. Cellar, superintendent of telegraph of the Pennsylvania Lines West of Pittsburg, states in Cement Age that as a result of a series of tests of concrete telegraph poles conducted by his company at Rochester, Pa., the Pennsylvania has erected a line of concrete poles thirty-five feet long, six inches in diameter at the top and nine inches in diameter six feet from the butt end. They are solid throughout, and were made by hand, the cost being approximately $15 apiece. Mr. Cellar states that, if made in quantities, the concrete telegraph poles could be built for $10 each, and that the cost might be further reduced by constructing large lots in a suitable manufacing plant with yard and derrick facilities, and the large means of lessening the cost afforded by mechanical and wholesale operations.

He believes that the use of concrete poles, with their added strength is very desirable in special locations where it is impossible to brace or guy, and especially for high-tension line construction, where the non-combustible poles are desired. Mr. Cellar does not feel that we shall long have wooden poles, type for type, at much less cost than concrete, but the added weight and intricacy of handling the latter makes their use, for the present at least, one of selection, and their adoption a matter of reduction in prices through wholesale methods of manufacture, and reduction in the cost of handling through improved facilities.

German-American Patent Treaty.

The American Association of Commerce and Trade in Berlin has issued an announcement on the effect of the new patent treaty between the United States and Germany. This treaty, which went into effect on August 1, places American citizens on a decidedly better footing in regard to the utilization of patent protection in Germany, as it frees them from the obligation to work their patented inventions in Germany within three years from the granting of the German patent. Heretofore any failure to comply with this working obligation would, in the case of an action for revocation of the patent being brought against the patentee, result in the loss to him of his German patent.

The new treaty provides that the working of a patent in the territory of one of the contracting parties shall be considered as equivalent to its working in the territory of the other party. Hence, an American citizen who works his United States patent in the United States will no longer be required to work his corresponding German patent in Germany in order to avoid loss of the German patent in case of an action for revocation being brought against him.

The new treaty, abolishing as it does, a condition of affairs that has been felt as a hardship by Americans, will no doubt induce many American inventors to apply for German patents where they would otherwise have abstained from so doing.

The Railroad.

The annual meeting of the Railway Signal Association occurred at Louisville, Ky., October 12, 13 and 14. Among the important subjects discussed were the reports of special committees on rubber-covered wire, storage batteries and lightning arresters.

The Union Pacific Railroad is the first railroad in the west to take active steps to show the applicability of wireless to railroad service. They will begin soon the erection of a large and powerful wireless station at their Omaha shops and conduct extensive experiments in the way of communicating with moving trains both by telegraph and by telephone.

The Pittsburg, Shawmut and Northern Railroad, Mr. C. L. Lathrop, superintendent of telegraph and signals, is reconstructing some of their telegraph lines and building forty miles of new line along an extension of their system. On all the new lines and those which are being rebuilt provision is made for the addition of telephone despatching circuits. Upon sixty miles of their road train orders are already handled by telephone. Mr. Lathrop was a New York visitor during the Hudson-Fulton celebration.

Mr. Benjamin R. Pollock, superintendent of the Midland division of the New York, New Haven and Hartford Railroad, has been appointed general superintendent with offices at New Haven. Mr. Pollock was born January 2, 1865, and entered the telegraph service as operator in 1879. In 1881 he entered the employ of the New York and New England Railway, which later became the New England Railway and in 1898 was absorbed by the New Haven system. His ability as an operator was shown in 1890 when at a speed tournament held in New York he took the first prize.

The Norfolk and Western Railroad has recently put into service two telephone circuits for handling its trains, one between Roanoke, Virginia, and Bluefield, West Virginia, 102 miles, the other between Bluefield and Williamson, West Virginia, 107 miles. There are sixteen stations on the former circuit and twenty-two stations on the latter. This equipment extends through some very mountainous country and affords a good test of telephone train despatching under very severe conditions. The equipment has been in service since September 25, and Mr. W. C. Walstrum, superintendent of telegraph, reports that both circuits have been giving excellent service since that time. A feature of interest in connection with one of these circuits is that the telephone was pressed into service before being fairly completed owing to the telegraph circuits having gone out of commission due to the recent widespread electrical disturbance attributed to the Aurora Borealis.

Meeting of Western Division of the Association of Railway Telegraph Superintendents.

The first meeting of the Western Division of the Association of Railway Telegraph Superintendents since the annual convention at Detroit last June, was convened in the office of Mr. John L. Davis, president of the Association, Chicago, at 10 o'clock a. m., September 28.

Mr. E. A. Chenery, of St. Louis, was unanimously re-elected chairman and Mr. F. E. Bentley was elected secretary.

There were present:

Canton, O.—B. Baughman.

Chicago—William Bennett, J. L. Davis, P. W. Drew, G. H. Groce, J. G. Jennings, W. W. Ryder, F. H. Van Etten and F. T. Wilbur.

Danville, Ky.—W. S. Melton.

Decatur, Ill.—G. C. Kinsman.

Denison, Tex.—W. H. Hall.

Indianapolis, Ind.—C. S. Rhoads.

Lincoln, Neb.—V. T. Kissinger.

Los Angeles, Cal.—I. T. Dyer.

Montreal, Can.—W. W. Ashald.

Omaha, Neb.—J. B. Sheldon.

Pittsburg, Pa.—G. A. Celler, G. A. Dornberg and L. A. Lee.

St. Louis, Mo.—F. E. Bentley, H. D. Teed and E. A. Chenery.

St. Paul, Minn.—G. Boyce and E. J. Little.

Among the associate members and visitors were: F. A. Baker, W. E. Bell, J. C. Browne, R. E. Chetwood, A. Douglas, N. R. Fill, J. H. Finley, W. E. Harkness, C. L. Howk, B. A. Kaiser, W. B. Minch, V. B. Mintun, H. O. Rugh and H. C. Smith.

The forenoon session was taken up in discussing the matter of high-tension wire crossings. It was finally decided that the high-tension-wire-crossings committee, of which Mr. G. A. Cellar is chairman, should prepare the matter to be presented to the General Managers' Association some time in October, with the view of securing their approval and the adoption by all roads of the proposed form of contract, which has already been adopted by the Pennsylvania Lines west of Pittsburg.

The members and visitors were entertained at luncheon by President Davis, the host of the occasion, in the banquet hall of the Illinois Athletic Club, thirty covers being laid, after which all were given opportunity to see the excellent appointments of the club.

At the afternoon session, Mr. F. A. Baker, of the American Telephone and Telegraph Company, explained at length the new so called standard agreement, which he said is to be presented soon by the local telephone companies to the railroad companies in connection with a comparative schedules of rates under the old and new standard agreements. A majority of those present seemed to feel that the new agreement is more flexible and allows greater latitude in the ownership of equipment than the old one.

Radio-Telegraphy.

The importation of wireless telegraph apparatus into British India is prohibited, except by persons to whom a license has been granted by the government.

The United States battleship Rhode Island while at anchor at Hampton Roads one morning recently was in communication with the high power wireless station at Chicago.

It is reported that the Lepel Wireless Telegraph Company is planning a system of wireless telegraph stations in Canada to parallel the lines of the present telegraph companies.

Active steps are being taken to erect a chain of wireless stations along the South African coast linking together the English colonies from Cape Colony to Delagoa Bay.

Patent No. 935,386, for wireless telegraphy, has been granted to W. W. Massie, of Providence, R. I. A magnetic detector, including a coil and magnets adjustable axially of the coil and also transversely of the axis.

At the meeting of the Wireless Institute of New York held at the Engineering Societies Building, October 6, Mr. F. W. Midgeley presented for discussion a paper upon "Proportioning Transmitter to Aerial."

A movement has been started to establish a wireless telegraph station at or near the summit of Mont Blanc. As this is near the frontiers of France, Italy and Switzerland, a station at that point could easily communicate with stations in the three countries.

The Russian government is planning to establish a wireless station on the peninsula of Kamchatka and is sending an official of their telegraph department to the United States to make arrangements for establishing communication with the stations which the United States government maintains in Alaska.

It is said that some of the wireless engineers are now working out plans for a system of despatching trains by wireless. It is planned to place the receiving and sending wires a few inches above the top of the cars. As an advantage of this method it is urged that if wireless despatching were used the trains would be in constant touch with the despatcher and not only at the blocks as at present.

In connection with the transfer of the wireless stations, which the Marconi Company operated in England, to the English government, Mr. Marconi states that if they are satisfied as to the regularity of the service the British Post Office Administration will give their transatlantic business to his company and in turn will handle the company's business in Great Britain. One of the conditions of this agreement is that the company shall not charge more than ten cents per word for commercial and five cents per word for press messages.

The Massie Wireless Telegraph Company has recently completed the installation of a new high power wireless station at the Duval Hotel, Jacksonville, Fla. This station will be operated in conjunction with the coastwise steamers and will also be in communication with Washington, New Orleans, Tampa and other cities.

The captain of the lightship off Nantucket Shoals being taken ill recently the wireless operator on board called up the Naval Hospital at Newport and the doctor there after hearing a description of the man's symptoms, prescribed for him. This method of treating the case was followed daily until the captain had recovered.

It is claimed that during tests of the Poulsen system of wireless telegraphy made between England and Denmark over a distance of about 600 miles, of which 200 miles was overland, a speed of 200 words per minute was obtained. By this system messages are transmitted from a perforated tape and received on photographically sensitized paper.

It is reported that an order for the equipment of forty-seven boats with the Clark wireless telegraph and telephone has been placed by Captain John Mitchell, of the Cleveland Steamship Company, with the Clark Wireless Telegraph and Telephone Company of Detroit, Mich. This is said to be the largest single order for wireless telegraph equipment ever placed with any wireless company.

According to the Electrical Review, London, the German Colonial Office authorities are negotiating with the Telefunken Wireless Telegraph Company for the establishing of communication by wireless telegraphy between Berlin and German colonies. It is proposed, in the first place, to raise the height of the Nauen station by about 160 feet, and experiments are to be made this year between the station and a ship proceeding to the Cameroons. If it is found possible to effect a connection between Nauen and the coast of the Cameroons, it is intended to link together the remaining German colonies in Africa so that they will be able to communicate with the Fatherland by way of the Cameroons.

The following patents have been awarded to G. Marconi, of London:

No. 935,381, for a transmitting apparatus for wireless telegraphy. Provides mechanically operated means for completing and interrupting the circuit synchronously with the time period of Hertzian oscillations of definite frequency; No. 935,382, for an apparatus for wireless telegraphy. An oscillation generator consisting of a disk with a continuous rim located between two rotatable bodies so as to form a spark gap, and No. 935,383, for an apparatus for wireless telegraphy. An oscillation generator in which a metal disk is rotated at high speed and is placed between two insulating conducting disks also rotated at high speed and provided with condensers so as to form a charging circuit.

The R. W. Martin Fund.

That the family of Mr. R. W. Martin appreciate the kindess of the many friends who have contributed so generously to the fund for their assistance is shown by the following letter from Mrs. Martin, which is one of many similar ones which we have received from her:

"I do not know how to thank you for taking your time and labor in looking after the fund, and to the kind friends who have so generously contributed I send sincere thanks and that God may bless you all is the wish of Mr. Martin and myself. Mr. Martin is slowly failing, but some days his mind is quite clear. I have to repeat things to him to have him understand."

The committee in charge of the fund consists of J. B. Taltavall, of Telegraph Age; Charles W. Price, of the Electrical Review; T. Comerford Martin, and T. A. McCammon and Fred Catlin, of the Western Union Telegraph Company. All contributions should be addressed to J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

The committee pays Mrs. Martin the sum of $50.00 each month out of this fund, hoping in this way to make the amount contributed last as long as possible.

Mr. Fred Catlin, of the Western Union main office, 195 Broadway, New York, in sending us $39.00 collected from various old friends of Mr. Martin's has this to say regarding the ability of "Rm," as he was familarly known:

"Mr. Walter P. Phillips' appeal for the Martin fund is another evidence of his stanch friendship for telegraphers, and I believe that all old timers will show their appreciation of his effort by joining hands with him in helping our unfortunate brother.

"Back in the sixties, down at 145 Broadway, I worked the Albany wire and Seymour Rice worked the other end. We handled from 500 to 550 messages per day, exchanging ten and ten. It was a hot proposition from start to finish, our only breaking spell being when Chief Operator Sam Edwards cut in with test business. There was a fair audience standing about the desk one day when Rice said: 'Rlf ga Rm.' Here was a chance for some fun with the uninitiated. I said to the boys: 'Now hear Bob squeal,' and started in at top speed with the worst combinations imaginable, with plenty of the 'National' swing and railroad style mixed and the whole thing one word, absolutely. No spaces whatever. It was one of my worst efforts ever, and I was very busy following my own transmission. There were remarks from those around me saying: 'You're sending into the ground—he ain't there.' 'Nobody can read that stuff,' etc., but I kept right on and finished my batch of ten messages in six minutes. Then came back like a flash. 'Rm. 217 Albany 15,' etc.; and I very promptly got busy. That was Bob. He fooled us. He simply would not break. If it didn't reach him he somehow knew what it should be, and that was where the quick brain told. Few, if any, were Martin's equal in this respect."

Mr. George M. Eitemiller has this to say in remitting $3.00 to increase his total subscription to the R. W. Martin fund to $5.00:

"It is hard to realize that one of our old stars, and Bob certainly was one, should be thus afflicted. We worked side by side in New York and Hartford, as well as pounded each other from opposite ends of the wire in days gone by and it is with pleasant memories I recall his beautiful, clean-cut Morse as it came rolling in. All the receiver had to do was follow him. He was also as much at ease in receiving, his pen copy being beautifully finished work. I hope all of the old boys will contribute to his comfort, to ease, in a financial way his worries in his sad affliction."

Mr. I. D. Maize, of Philadelphia, in sending a contribution from the Western Union operators in that city, says:

"This would be a cruel, heartless world, indeed, did we disregard appeals to our sympathies when called upon to help to cheer the declining days of one of our craft. At the request of Chief Operator J. P. McLoraine, I was assigned the very pleasant duty of raising a fund for the relief of old-timer Martin, who is widely known all over the country. I found the responses beyond my most sanguine expectations, especially as the only persons who knew Martin personally, on the list, are Messrs. W. A. Connor, John Hoffman, Frank Webb, E. W. H. Cogley, and myself. The fact that so few here knew him did not debar any that I asked from adding something to the fund. May the enclosed check for $27.50 help to cheer old 'Rm' up. We all hope that the contributions from elsewhere may be enough to make him comfortable for the remainder of his life."

Mr. Henry A. Reed, president of the Bishop Gutta-Percha Company, of New York, writes: "Please apprize Bob Martin of my sympathy and use the enclosed check for his benefit. He will remember me as manager of Poughkeepsie, N. Y., office at the time he learned telegraphy." Mr. Reed is a forty-niner of the telegraph and was manager of the Poughkeepsie office for many years while Professor S. F. B. Morse, the inventor of the telegraph, was a resident of that place.

The amount received to date is: Previously acknowledged, $270.50; Fred Catlin, of New York, $39.00, as follows: W. H. H. Hoyt, $2.00; E. Mesler, $1.00; W. L. Waugh, $1.00; J. Rathbone, $5.00; W. H. Jones, $1.00; M. Irwin, $1.00; Fred Catlin, $3.00; J. T. Collins, $1.00; M. Green, $1.00; F. G. P. Griffith, $1.00; A. A. Offutt, $1.00; D. Harmon, $1.00; N. B. Topping, $1.00; F. D. Murphy, $1.00; W. B. Purcell, $1.00; J. F. Byrne, $1.00; A. Morrison, $1.00; J. H. Montgomery, $1.00; W. L. Ives, $1.00; Jno. R. Heidemark, $1.00; W. H. Mayer, 50c; Clay Danforth, $1.00; G. B. Pennock, $1.00; W. A. McAllister, $1.00; E. M. Smith, 50c; Geo. W. Ellis, $1.00; J. F. Mor-

rissey, 50c; C. J. Lawson, 50c; G. F. Stainton, $1.00; Richard Spillane (an old timer, now Sunday editor of the New York Press), $5.00.

Mrs. Minnie Swan Mitchell, New York, $5.00; Nicholas Peterson, $1.00; J. V. Burkman, $1.00; E. C. Boileau, Philadelphia, $1.00; a friend, Hartford, Conn., $1.00; I. M. Uppercu, general manager, Cadillac Automobile Company, New York, $10.00; Henry A. Reed, New York, $5.00; G. M. Eitemiller, Detroit, $3.00.

Detroit Postal operators, $10.00, as follows: Mr. Scott, $2.00; G. M. Eitemiller, $2.00; Mr. Burghardt, $1.00; W. C. Griffin, 50c; B. C. Van Valkenburg, 50c; B. H. Watson, 50c; C. C. Barr, 50c; J. T. Wick, 50c; R. B. Mulry, 50c; J. Surtman, 50c; G. W. McMaster, 50c; J. Z. Hayes, $1.00.

Philadelphia Western Union operators, $27.50, as follows: I. D. Maize, $1.00; J. P. McLoraine, $1.00; Mahlon G. Moyer, $1.00; J. T. Wilde, $1.00; R. C. Murray, $1.00; T. W. Bair, $1.00; H. V. Shinn, $1.00; Mr. Scott, 25c; C. B. Wood, 25c; D. McBride, 25c; Miss R. Smith, 25c; J. M. Smith, 25c; J. Bailey, 25c; Mr. Rainer, 25c; Mr. Heary, 25c; F. Scott, 50c; Miss Arthur, 25c; Mr. Moyer, 25c; Miss Gregg, 25c; D. Good, 25c; O. M. Pennypacker, 25c; Mr. Truitt, 25c; C. M. Pennypacker, 25c; Mr. McGovern, 25c; Mr. Sisk, 25c; Mr. Berger, 25c; Mr. McElroy, 25c; Mr. Durnin, 25c; E. L. Maize, 50c; E. W. H. Cogley, $1.00; W. A. Connor, $1.00; J. W. Read, $1.00; Cash, $1.00; W. S. Lytle, 50c; H. M. Hall, 25c; O. H. Spracklin, 50c; F. R. Webb, $1.00; J. E. Gould, 50c; A. W. Damon, 25c; H. H. Peck, 25c; W. C. Shuger, $1.00; S. S. Peck, 50c; R. Brown, 50c; E. Truitt, 50c; J. E. Mullin, 50c; E. A. Dos Santos, 25c; F. L. Fiester, 25c; J. P. Richards, 25c; H. M. Clayton, 25c; F. Gessner, 50c; Miss Leister, 25c; Robert Mecredy, $1.00; John Hoffman, 25c; Mr. Stone, 25c; E. R. Beidelman, 25c; D. Gifford, 25c; Miss Grimley, 50c. Total, $374.00.

Heliograph Signaling.

Editor Telegraph Age:

I enclose herewith the following description taken from the Philadelphia Press of the heliograph which is used in the army for signaling purposes:

The heliograph, or heliostat, is an instrument used in optical experiments for keeping a beam of sunlight always falling in the same direction in spite of the motion of the sun. It consists of a mirror mounted equatorially, and when used for signaling a beam of light is directed to the point to which it is intended to convey the signals. The dot and dash telegraph alphabet is used, by exhibiting and obstructing the beam of light for longer or shorter periods. A short flash represents one letter, a long one another, a short followed by a long flash another, and so on.

This recalls to my mind a time forty years ago when Commodore Bridges of the United States Navy called on Mr. James Merrihew, manager of the Philadelphia office, for two operators to go with him on some experiments he had in view. He took us down to the old Navy Yard, and before proceeding to set up his instruments, he explained to us that he wanted to telegraph at a distance with the aid of the sun. He then put up his instrument which consisted of a four-inch stovepipe about two feet long, back of which he had placed a couple of mirrors which reflected the sun through the pipe to the operator at a distance. In the pipe there was a slot in which was placed a disc which was operated with a telegraph key, shutting off and turning on the reflections. Mr. Dyer was placed at the far end of the yard, and after getting the focus on his eyes, (it was hard on the eyes, though) I worked the key and communicated with Mr. Dyer, and we were quite successful in sending messages. We experimented for two or three hours when the sun became obscured and we had to stop. The intention was to include a trip out to the middle of the Delaware on a tug and signal to shore, but we did not get that far before the clouds arose. His idea was to complete a system by which he could communicate from the shore to naval vessels and vice versa. He was then in doubt as to whether the rocking of the vessel would not throw the reflections out of alignment. This was before wireless was invented and was intended to be used for the same purposes that wireless is now used.

Commodore Bridges said he would call on us again to continue his experiments, but he died shortly afterward and that is the last I heard of it until I saw the description given herewith. Mr. Dyer is still living in Washington.

I. D. Maize.

Philadelphia, September 28, 1909.

New York Telegraphers' Aid Society Annual Eentertainment.

The annual entertainment and reception of the New York Telegraphers' Aid Society for the benefit of the relief fund, will be held on Tuesday evening, November 9, at the Lexington Avenue Opera House and Terrace Garden, Fifty-eighth Street and Third Avenue. Mr. J. J. Riley, manager of the Western Union Telegraph office at 319 Greenwich Street, is chairman of the entertainment committee for this season and is striving to make this year's affair a great success. As usual, a high-class vaudeville performance will be given and a pleasant evening is assured to all who attend. The object of these entertainments is a most worthy one, and they should receive the hearty support of the craft in general.

The relief fund is used to defray the expenses of members of the telegraphic profession who are not affiliated with beneficial organizations, in times of sickness and to provide proper burial in case of death. The fund is in charge of and is disbursed by the officers of the New York Telegraphers' Aid Society without any remuneration to themselves. It is the proud boast of the profession that every telegrapher who dies in New York without means receives proper burial. The relief fund makes this possible and Mr. Riley should receive the hearty support of all in his efforts to make this entertainment a success.

Obituary.

M. T. Quigley, manager of the Canadian Pacific Railway Company's telegraph at Vancouver, B. C., died of cancer, October 6.

Thomas A. Bell, aged forty-eight years, manager of the Philadelphia Commercial Exchange office of the Western Union Telegraph Company, died October 10.

Mrs. George O. Smith, the wife of the old-time telegrapher and former manager of the Western Union offices at Oil City, Pa., and Canton, O., and now connected with the Cleveland, O., office, died October 12 at Mount Clemens, Mich.

Milo G. Kellogg, founder and president of the Kellogg Switchboard and Supply Company, Chicago, died September 26, aged sixty years. Mr. Kellogg had been prominently connected with the telephone industry for the past thirty years.

Thomas C. MacKenna, for over forty years connected with the telegraph department of the New York Herald, died at his home in Whitestone, Long Island, October 3, aged sixty-three years. Mr. MacKenna was born in Ireland and served as a government telegraph operator in that country before coming to the United States.

Edward L. Parmelee, aged sixty-five years, who had worked continually for the Western Union Telegraph Company, at St. Louis, for the past forty-five years, died on October 6. Mr. Parmelee was one of the best-known figures in telegraphic circles in the city in which he resided, and was at the same time the oldest in continuous service. He saw the St. Louis office force grow from ten employes to over 400. Mr. Parmelee was born at Lockport, N. Y., and in 1865, just before going to St. Louis, worked side by side with Thomas A. Edison in the Indianapolis, Ind., office.

General Mention.

At the annual meeting of the Philadelphia, Reading and Pottsville Telegraph Company, October 4, the directors and officers were all re-elected.

Mr. C. F. Kuehn, of the telegraph department of the Lake Shore and Michigan Southern Railway, Cleveland, was a New York visitor during the Hudson-Fulton celebration.

Siemens Brothers and Company, of London, have developed a selective device for use on a telegraph line with many stations to call up any individual station by means of a bell signal, without disturbing any of the other stations.

The forty-third annual meeting of the Telegraphers' Mutual Benefit Association for the election of officers and the transaction of such other business as may come before the meeting, will be held at 195 Broadway, New York, Wednesday, November 17.

LETTERS FROM OUR AGENTS.

NEW YORK, WESTERN UNION.

Frank D. Giles, assistant chief operator, David McAneeney, eastern wire chief, and Hugh Moody, tube chief, are absent on vacations.

Miss Mary Haines, of this office, and Mr. J. Waldron, of Amsterdam, N. Y., were married Saturday, October 2.

G. H. Worzel, who has been employed in this department, as office wireman, for the past thirty years, and who has worked for the company forty-five years, resigned from the service October 6. "George," as he was familiarly known, was of a genial disposition and ever obliging, and he will be missed by a host of friends, who wish him a long and happy life of contentment and ease.

Miss Jane F. Powell, who has been located at the United States Hotel, Saratoga, for the Summer, has resumed duty, having fully recovered from the injuries received recently in an automobile accident.

Trade Notes.

The Steel Car Forge Company, of Pittsburg, has recently placed on the market a new style of combination guy wire clamp which it is claimed has several advantages over the ordinary types in general use. The main feature of this device is a center bolt which can be turned with an ordinary wrench and the end of the wire being wound around the bolt, the slack in the guy is easily drawn up. A pawl placed in a suitable recess in one part of the clamp engages notches cut in the shank of the bolt just below the head and thus keeps it from turning backward. The process of tightening the guy can thus be accomplished by one man with a wrench, no tackle blocks or turnbuckles being required. If at any time after installation the guy becomes loose all that is necessary to tighten the same is to loosen the clamping bolts with a wrench, turn the center bolt until the slack is removed and tighten the clamping bolts again. The company will be glad to correspond with anyone interested in this device and will submit free samples upon request.

The Electric Storage Battery Company is distributing an interesting bulletin, No. 116, giving "Some Points on the Operation and Care of 'Exide' Vehicle Batteries," which is a reprint of a paper read by one of their engineers at a convention of automobile engineers. The information contained in the bulletin applies equally well however to the care of batteries used for other purposes.

The Kellogg Switchboard and Supply Company, of Chicago, and the Dean Electric Company, of Elyria, have united interests and a new company to be known as the Kellogg-Dean Electric Company will take over the business and factories of the two concerns.

The business of the Western Electric Company for September showed an increase of over fifty per cent. above that of September, 1908. If the present condition continues the gross business for the fiscal year ending November 31, 1909, will amount to about $47,000,000 or over forty per cent. greater than their last year's sales. The company now has 17,000 employes on its payrolls as against 13,000 a year ago.

The attention of our readers is called to the advertisement of The Central Typewriter Exchange, 203 Broadway, New York, which will be found on another page.

Mr. James H. Keesey, sole proprietor, is one of the most expert typewriter men in the country and for twenty years has been connected with the leading New York typewriter houses.

The fact that this concern takes charge of the rebuilding and repairing of the hundreds of typewriters in use by the American Newspaper Supply Company, the Hearst News, the United Press and many of the leading insurance and railroad companies clearly indicates that they are in the first rank as masters of the rebuilt typewriter business, and we cheerfully recommend this company to any of our readers who may want to purchase, rent, or have their typewriters rebuilt or repaired.

Telegraphers' Aid Society Quarterly Statement.

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

Balance on hand June 6, 1909		$23,474.81
Receipts		1,479.70
Total		$24,954.51
DISBURSEMENTS.		
Sick benefits	$481.71	
Death benefits	200.00	
Expenses	163.88	
		845.59
Balance on hand September 6		24,108.92
Total		$24,954.51
RELIEF FUND.		
Balance on hand June 6, 1909		$4,299.67
Receipts		58.00
Total		$4,357.67
Disbursements		219.50
Balance on hand September 6		4,138.17
Total		$4,357.67

The Serial Building Loan and Savings Institution, of 195 Broadway, New York, which is managed by telegraphers, is well known as an institution which has fairness as its foreword. It furnishes a safe depository for your savings, paying five per cent. interest, or it will assist you in buying a home. Inquiries by mail or in person receive prompt attention.

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

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.

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.

PHILLIPS CODE.

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

The use of this system promotes rapid transmission, and for press reports especially was long since declared to be the best ever devised. By common consent it is recognized as standard and everywhere is regarded in the profession as indispensable in contributing to the operator's fund of practical knowledge. In fact not to understand Phillips' Code acts as a distinct embarrassment to the operator.

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

LIGHTNING FLASHES AND ELECTRIC DASHES.

This is a book made up of bright, ably written stories and sketches, telegraphic and electrical, that should find a place in the home of every telegrapher; 160 large double-column pages; profusely illustrated. Price $1.50. Address J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

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

A new edition of Maver's "American Telegraphy and Encyclopedia of the Telegraph" is now ready for delivery. This will be known as the 1909 edition. The more important additions to the work at this time are descriptions of the Murray Printing Telegraph as now used in Europe, and of the Barclay Long Distance Printer, as operated on the lines of the Western Union Telegraph Company. This standard work on telegraphy now contains 668 pages and 492 diagrams. The new edition comes out in a new and distinguishing cover of dark green cloth. This book is a library on telegraphy in all its branches. It is used as a text-book in some of the largest universities in this country. It is written in plain English and practically without recourse to mathematics; hence it comes within the comprehension of the veriest beginner. No aspiring telegrapher can afford to be without it. This fine work will be sent to any address, carrying charges prepaid, on receipt of price, $5.00, by J. B. Taltavall, Telegraph Age, 253 Broadway, New York.

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