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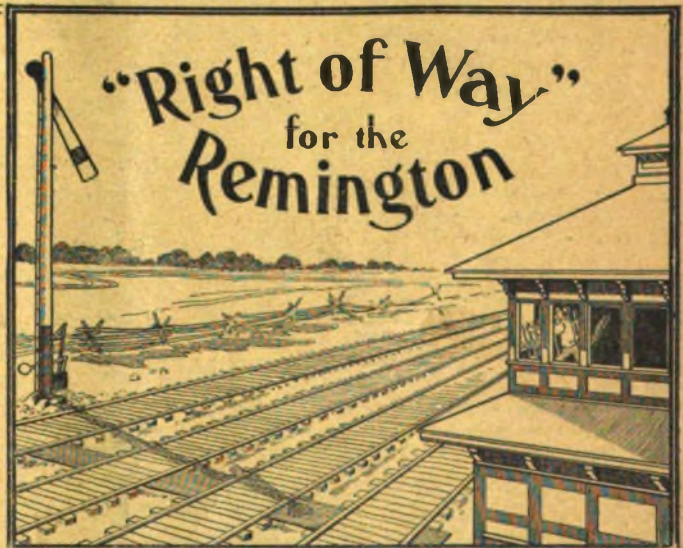
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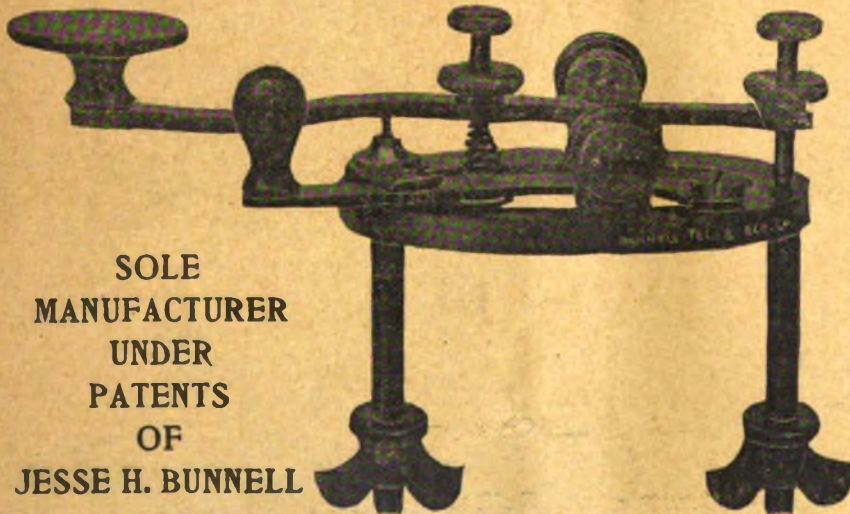


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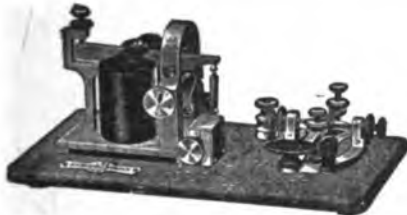
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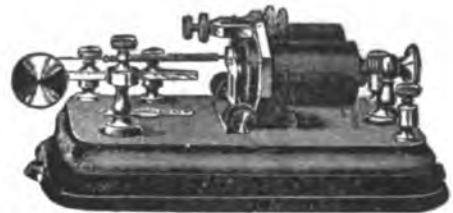
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THE TELEGRAPH AGE.

No. 3.

NEW YORK, FEBRUARY 1, 1901.

VOL. XXIV.

CONTENTS.

Some Points on Electricity.....	45
Recent Telegraph Patents—Telegraph Company Not Subject to Tax—Business Notices—Miscellaneous Items.....	46
Gold and Stock Life Insurance Association—A Characteristic—Greeley Incident—Printing Telegraph.....	47
Obituary Notes.....	48
Death of Prof. Elisha Gray—Resignations and Appointments—Recent New York Visitors.....	49
Cable Manufacture in the United States.....	50
Mr. Mason and the International Association of Municipal Electricians—Signalling Under the Sea.....	51
Electric Building Loan and Savings Association of New York..	52
Editorial—Queen Victoria—A Telephonic Episode—Pupin's Patents Sold to American Bell Co.....	53
More Submarine Cables—Dominion Cable Inquiry—The Telegraph.....	54
The Growth of the Telephone.....	55
The Telegraph in the Nineteenth Century.....	56
Accorded First Place—Publications—The Pacific Cable Bill.....	58
Correspondence—"Proper Amount of Current;" "Recording Sales at the New York Stock Exchange;" "6 Plk".....	59
Telegraph Operators in the Philippines.....	60
Congressional Roll-Calls and Voting by Electricity—Swedish Telegraph—Serial Building Loan and Savings Institution—What Constitutes Regular Service.....	61
To Our Correspondents—Philadelphia, Western Union; Buffalo, Western Union; Cincinnati, Notes.....	62
Chicago, Western Union; Kansas City, Western Union.....	63
Havana, Notes; Denver, Notes; St. Louis, Western Union; San Francisco, Western Union; Philadelphia Postal.....	64
Pottsville, Notes; Lima, Notes; New York, Postal; New York, Western Union.....	65

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

The Galvanometer—Continued.

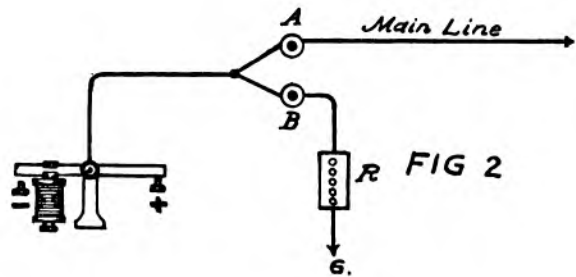
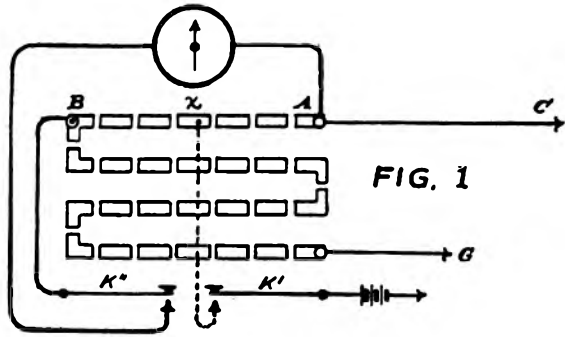
The next matter to be considered is the manner in which the Galvanometer is handled. Up to this point we have simply described the construction and principal features of the instrument, all of which go to show that the object desired is to obtain a very sensitive device, the needle of which will indicate by its deflection the presence of an electric current. It remains to be told how to connect the galvanometer outfit properly in the various circuits to be measured and give the reasons for altering the connections to fit the various tests one may desire to make.

It is not the purpose of the writer to go too deeply into this subject in this series of articles. In fact, it would be highly out of place to destroy the interest of the general reader by wading beyond his depth. What a beginner desires is the knowledge of how and why certain connections are made. Individual preferences as to the manner of making certain connections may be learned later on by pursuing the subject in standard works on the galvanometer by well-known authors.

For the ordinary tests required in a telegraph office, the connections are remarkably simple. If one would stop and think for a moment, the proper connections will almost suggest themselves. To illustrate this point let us suppose that it is desired to measure the conductivity; that is to say, the resistance in ohms of a telegraph conductor. Where should we attach the conductor to the outfit, and why?

Before giving the reader this information let us first examine a diagram of a differential duplex cir-

cuit and note what conditions exist therein after a line balance has been taken. Of course the reader understands that a line balance means the insertion of an amount of resistance in the rheostat equal in value to that of the external telegraph circuit itself, and that the object of building this artificial companion wire is to obtain a duplicate circuit for the purpose of counteracting the detrimental magnetic effect which the home current, without such a circuit, would exert upon the armature of our own relay; also that this magnetic effect is only destroyed when the amount of resistance in the rheostat is exactly equal to that of the external telegraph circuit. In other words, the inserted resistances in a rheostat, after a balance has been taken, represents the true value of the external line circuit, while the total absence of all magnetic effect upon the armature of the home



relay indicates that the proper amount of resistance to bring about this result has been inserted, and the process of balancing completed.

If the reader will note the connections closely he will see that the battery current splits at A, one-half of it traversing coil A and line L, while the other half finds an outlet via coil B and the rheostat R. We have just stated that after a balance has been taken that portion of the line between A and C contains just the same amount of resistance as that unplugged in the rheostat, hence A—C is equal to B—G; and as the two coils of a duplex relay are obviously identical in ohmic value, it follows that X—A equals X—B. We thus have four "arms," or two pairs, which compensate each other when properly equalized, and thereby eliminate all traces of magnetism from the vicinity of the relay arma-

ture or other device inserted between, or connected across, arms A and B.

Now this identical arrangement is followed closely in the construction and connections of the testing outfit of a galvanometer. In Fig. 2 resistance arms X—A and X—B are made equal in ohmic value, and correspond respectively to the relay coils X—A and X—B in the duplex cut. In like manner, B—G in each cut is an adjustable rheostat identical with each other in principle and in operation.

In both illustrations it will be seen that the respective devices (the needle and the relay armature) which we wish the current and magnetism to act upon are placed directly between coils A and B. Finally, as if to make the analogy between the handling of a duplex apparatus and a galvanometer outfit still closer, the plan of procedure is practically identical. In both devices the aim is to eliminate the current and magnetic influence from route A—B.

In a polar duplex we attain this end by first "centering" the armature of the relay, and then adjusting the rheostat until the said armature feels no trace of magnetism from the home battery. With the galvanometer the needle, situated between A and B, is likewise "centered"; that is to say, first made to point to zero—and with the conductor to be measured connected to arm A, the process of freeing route A—B from magnetic influence is accomplished in the same manner by altering the amount of resistance in the rheostat. In other words, by taking an ordinary duplex "balance."

(To be continued.)

Recent Telegraph Patents.

A printing telegraph has been patented by H. Mahnken, of New York city.

Mr. E. Kinsman, of Malaga, N. J., has taken out a patent for a printing telegraph.

Mr. Harry T. Johnson, of Jersey City, N. J., has patented a telegraphic instrument.

A type-printing telegraph has been patented in this country by A. Franke, of Berlin, Germany.

A patent for a telegraph or telephone call mechanism has been obtained by E. E. Salisbury, of Chicago.

An electric wave-indicating telegraph instrument has been patented by Warren S. Johnson and Charles L. Fortier, of Milwaukee, Wis.

Mr. L. G. Woolley, of Kenton, Ohio, has obtained a patent for a fire alarm telegraph. This embraces a motor and magneto-electric generator so arranged as to send an impulse over the circuits at intervals to indicate the condition of the lines.

TELEGRAPH COMPANY NOT SUBJECT TO TAX.
—Judge Henry, of the Circuit Court of Missouri, has handed down a written opinion deciding that the State of Missouri, represented by the State Board of Equalization, had no right to tax the franchise of the Western Union Telegraph Company.

TELEGRAPH AGE is of value to you.

Business Notices.

Mr. Lyman C. Smith, of Syracuse, New York, president of the Smith-Premier Typewriter Company, has been made a Chevalier of the Legion of Honor of France. This honor is conferred in recognition of Mr. Smith's efforts in developing the typewriter manufactured by his company to a high standard of excellence, and for the fine exhibit of the same made at the Paris Exposition. The Legion of Honor was founded by Napoleon I., and its badge was first given to soldiers for valiant deeds of bravery. Later it came to be conferred upon authors, artists, and others. In the present instance, its bestowal will be accepted as reflecting most creditably upon the Smith-Premier product, hence a deserved recognition of American mechanical merit.

The Electric Storage Battery Company, Philadelphia, has placed on the market a new type of chloride accumulator especially adapted to the requirements of telegraph, fire and police alarm, laboratory and other service where voltage rather than amperage is desired. This "BT" type, although of identical plate construction with the other sizes of accumulators manufactured by this company, is peculiar in having the positive and negative plates, together with the lugs or connectors cast in one section, forming "couplets," in this way obviating entirely the necessity for bolt connectors or burning to set up the battery. The plates are simply lowered in the receiving jars and the only connections to be made are at the terminals, thus effecting a very considerable saving of labor in installation. The "BT" cell is made in one size only, the plates being four by three and one-sixteenth inches, the discharge in amperes for eight hours being three-quarters of an ampere; for five hours, one ampere, and for three hours, one and one-half amperes. A circular describing these cells will be forwarded upon application to any of the company's offices.

Miscellaneous Items:

Mr. Sterns Francis Jones, electrician from the electrical engineer's office of the Postal Telegraph-Cable Company, New York, has been detailed to superintend the equipment of the large new offices of this company in Indianapolis, Ind., and Cleveland, O. He will also make some important changes in the large main operating room of the Postal company in the Stock Exchange Building, Chicago. This room, when fitted up in December, 1895, was conceded to be one of the best arranged in the world, but since then, so greatly have time and labor-saving devices and improvements in apparatus been developed, that the present office has become antiquated. Mr. Jones will, among other things, install in the above-named offices some of the switch devices of Mr. J. F. Skirrow, assistant manager of the New York office of the Postal company. Mr. Jones lately completed the fitting up of the new office of the Postal company in Philadelphia, and his work there has received the highest praise.

Mr. E. E. Dildine has been appointed assistant superintendent of telegraph of the Northern Pacific Railway Company, with headquarters at Tacoma, Wash.

Mr. Emmet J. Gordon, manager of the Postal office at Sedalia, Mo., has been transferred temporarily to Jefferson City, the capital, for legislative work during the session of the Legislature. During his absence his place will be filled by C. L. Forey, of Wichita, Kan.

Mr. A. Faden, manager of the Postal branch office at 48 North Morgan street, Chicago, Ill., in recently renewing his subscription to this paper, said: "TELEGRAPH AGE is the very best telegraph paper ever published, and under no circumstances would I be without it."

Miss Annie Mullins, manager of the Postal office in the Monadnock Building, Chicago, Ill.; recently spent a brief vacation at St. Paul, Minn., in company with a party of old school friends. During her absence Mr. F. T. Wynne acted as manager, assisted by Miss Mary O'Connor.

Personal Mention.

The friends of Mrs. Charles A. Tinker, wife of the general superintendent of the Western Union Telegraph Company, New York, will be pained to learn of her serious illness at her home in this city.

Mr. William B. Gill, superintendent of the Western Union Telegraph Company, at Philadelphia, Pa., returned lately from a sojourn at Old Point Comfort, Va., where he had been to recuperate from an attack of grip.

The Gold and Stock Life Insurance Association.

The 23d annual meeting of the Gold and Stock Life Insurance Association was held in the Western Union Building, New York, January 21, President Charles P. Bruch in the chair. There were about 50 members present, the meeting being one of the largest held in recent years. In the president's report, emphasis was placed upon the excellent financial condition of the Society. It was pointed out that the gain in assets over the previous year, amounted to \$1,614.07, while the expense of management was but \$367.01. Mr. Bruch recommended that careful consideration be given during the coming year to the subject of graded rates for future members, with a view to action at the next annual meeting. The reports of the secretary, treasurer, auditors and trustees, were read. It was shown that the present membership numbers 1,054, a gain of 43 during the year; assets over all liabilities, \$12,930.36, as against \$11,315.36 of a year ago; cash balance on hand of \$15,093.36, and payable on claims, but not yet due, \$2,460. When the nominations for officers were called for, prior to the election which followed, President Bruch called Mr. John Brant to the chair. Mr. Bruch was renominated for president, and a ballot was directed to be cast for him by the secretary of the meeting, Mr. Charles E. Refford. The entire ticket elected, which returned all of the old board, is as follows: Charles

P. Bruch, president; George W. E. Atkins, vice-president; William J. Dealy, secretary; Lewis Dresdner, treasurer; Michael Breslin, Charles Shirley, David B. Mitchell, Fred O. Nourse, Albert J. Driver, executive committee; Frank H. Nicholls, William Shone and Michael J. O'Leary, auditing committee.

Among those present were: W. L. Ives, T. E. Fleming, G. F. Fagan, John Doran, Michael Doran, C. S. Pike, C. P. Bruch, W. J. Dealy, C. E. Refford, A. M. Guest, H. A. Moody, F. O. Nourse, John Rathbone, F. D. Murphy, G. W. Logan, G. A. Newton, John Brant, John Heidemark, L. Dresdner, Joseph Knittle, Michael Breslin, H. E. Wright, W. T. Budds, W. Vitch, F. Gerber, M. Redmond, W. F. Lewis, J. H. Montgomery, Ramage Ferguson, William Shone, P. Kruger, R. L. Bamford, A. J. Driver, H. E. Crowell, A. Doherty, G. C. Sigler, F. E. Fitch, Charles Shirley.

A Characteristic Greeley Incident.

Major George S. Williams tells the following story in the Inland Printer concerning Horace Greeley:

Stanley Huntley was sent to report a meeting of the Farmers' Club for the Tribune. The members became involved in a wordy quarrel over the merits of a new potato and made themselves ridiculous. Huntley had a keen sense of humor and wrote a very amusing account of the meeting.

The next day Mr. Moore, the city editor, told Huntley that Mr. Greeley wished to see him. The reporter rapped at the chief's door, and hearing the squeaky "Come in," stood waiting.

"What do you want?" demanded Greeley, angry at being disturbed.

"You sent for me, sir. My name is Stanley Huntley."

"The — it is! So you're the — fool that wrote up that Farmer's Club meeting. You made them look like a pack of fools, and so they are. But you oughtn't to have done it. I know they are a lot of fools, but it mustn't be said so in the Tribune, for, young man, I'm the president of the Farmers' Club."

PRINTING TELEGRAPH.—A series of tests of the Murray page-printing telegraph system recently made between Boston and New York, extending over a fortnight, were remarkably successful, a column of the New York Herald being repeatedly transmitted without any error at speeds varying from 60 to 96 words a minute. A number of ordinary commercial messages were also transmitted with equally satisfactory results.

Farmer Hayseed: No, I don't want any more labor-savin' machines. I've tried enough of 'em. Look in there. That's a typewritin' machine my wife spent all her egg money to git for me, 'cause I ain't very handy with the pen. Just look at the 'tarnal swindle.

Agent: What's the matter with it?

Farmer Hayseed: Matter? Why, you can't even write y'r name with the 'tarnal thing unless you know how to play a church organ.

Obituary.

MRS. BENJAMIN O. STRONG.

The brief announcement made in our last issue of the death of Mrs. Benjamin O. Strong, formerly well known among telegraphers as Miss Lizzie H. Snow, we are now able to supplement with further information which will interest many of our readers.

Mrs. Strong was born July 29, 1838, at Orleans, Mass. She learned telegraphy while still in her "teens," and was in charge of several different offices on the original Cape Cod telegraph line, between 1855 and 1860. The Cape Cod line at that time was largely used for the purpose of transmitting maritime news to the Exchange in Boston. This business was quite new and required the exercise of careful discretion and sound judgment, ordinary commercial telegraph business and railway dispatches forming also a large part of the occupation of the few wires then in use. After the American Telegraph Company had acquired the local companies in the East, Mrs. Strong was selected to take charge of the city line service at the general office at 109 State street, Boston, in which ladies were exclusively employed. In this responsible position she earned the commendation of all the officials and enjoyed the good-will of her many associates of both sexes among the operators. Among them was the now famous inventor, T. A. Edison, Mr. L. C. Weir, now president of the Adams Express Company, who had been her mentor in learning telegraphy while on "the Cape," and others who subsequently attained prominent and responsible positions in commercial service.

While General Marshall Lefferts was in charge of the operation of the American Telegraph system, Mrs. Strong was appointed manager of the city line department of New York City, and occupied this position for about fourteen years, during which the girl's school for telegraphy in Cooper Union was established at the instance of Mr. Peter Cooper and for a long period it was under the general direction of Mrs. Strong, while still occupying the position of city line manager for the Western Union Company. Her industry, self-reliance and faculty of management were quite remarkable and commanded the respect and esteem of all who knew her. In 1875 she returned to her native State and was for some years employed in the Union Pacific Railway Company's office, in Boston, having charge of the telegraphic and certain other important affairs connected with that railway company's Boston office under the direction of Hon. Frederick L. Ames. She retained her intimate friendships in Plymouth during all this period, and about ten years ago resigned her latest position to become the wife of Mr. Benjamin O. Strong, of Plymouth, to whom she was married February 17, 1891, and had since resided there.

Those who knew her best were aware how ably and trustworthily she had discharged the duties of an exceptionally active life, and held Mrs. Strong in high esteem, fully sympathizing with the sorrowing husband and family in their bereavement. The funeral took place on Monday, January 7, the Rev. J. F. Thompson, late rector of the Plymouth

Universalist Church, officiating, and many of her townspeople testified their respect and regard by their presence.

Edward L. Norcross, formerly manager of the Western Union office at Terre Haute, Ind., and a well-known Mason, died in that city on January 11, aged 61 years. Mr. Norcross was born at Brattleboro, Vt. Early in life he became a telegrapher, and for thirty-eight years was the manager of the Terre Haute office, resigning his position there in January, 1900, in order to enter other business. Mr. Norcross was a widower and leaves no children.

Dr. Wm. A. M. Mack, Mayor of Elizabeth, N. J., and a well-known physician, died on January 14, aged 43 years. He started his business career as a telegraph operator when 17 years of age, and by his own exertions raised himself to a position of influence and wealth. He had charge of the telegraph office at Elizabethport, and while working at the key he employed his spare moments to study medicine. He graduated in 1878. Entering upon his new profession, his medical practice became immense; he attained wide popularity and was twice elected Mayor of Elizabeth.

William W. Thweatt, one of the oldest members of the Baltimore, Md., Western Union force, died in that city January 12 in the 62d year of his age. He was a Virginian by birth and during the Civil War served as an operator in various Southern cities. In 1867 he accepted a position with the old United States Telegraph Company at Washington, D. C., afterwards becoming the manager of its Richmond, Va., office. For a time he abandoned telegraphy for railroad work, but this was not congenial to his tastes, and in 1875 he entered the Signal Service at Washington. Since 1877 he has been in the Western Union employ at Baltimore. He leaves a wife, a son and daughter.

Charles P. Dwight, of Toronto, Ont., assistant general manager of the Great Northwestern Telegraph Company, of which his father, H. P. Dwight, is president and general manager, died on January 20, of pneumonia, after a brief illness. Mr. Dwight was born twenty-nine years ago in Toronto. After receiving a college education, about ten years ago he entered the employ of the Great Northwestern Telegraph Company, where by sheer ability he worked his way up to the position he lately held, and to which he was appointed three years since. Mr. Dwight possessed exceptional executive abilities, a wide range of general information and was making an excellent record for himself in the company with which he was associated, and his future was one of bright promise. He had a literary turn of mind and his sketches were occasionally noticed in various publications.

Alfred H. Seymour, a well-known New York telegrapher and manager, died of pneumonia on January 16 at his home in Brooklyn. He was born in Manlius, N. Y., sixty-five years ago, becoming an operator when but a lad, and in the course of

his life had worked in many of the chief cities of the country. In 1864 he was chief operator for the American Telegraph Company and later held a similar position with the Pacific and Atlantic Telegraph Company at New York. After the demise of the latter in 1874, he went into the service of the Mutual Union Telegraph Company, remaining there as manager for several years, and afterwards becoming manager of the main office of the Postal Telegraph-Cable Company, New York. For ten years past he has been an operator in the office of the Brooklyn Times, and was an occasional contributor to the literature of his profession.

Death of Professor Elisha Gray.

Prof. Elisha Gray, the well-known inventor, died suddenly at Newtonville, near Boston, Mass., on January 20. He had been East for nearly two years for the purpose of perfecting a system of submarine signalling which would enable a ship at sea to detect the approach of another vessel ten miles or more away. In this he was associated with Arthur J. Mundy, and great hopes were entertained of a successful outcome of their joint labors. The system is referred to elsewhere in this issue.

Prof. Gray was born in Barnesville, Belmont County, O., on August 2, 1835, and was the son of David Gray, a native of Pennsylvania and of Scotch ancestry. When 12 years old his father died and he was thrown upon the world. Apprenticed to a blacksmith, he found, after he had mastered the trade, that it was too severe for him. Then he sought an apprenticeship with a ship joiner in Brownsville, Pa., and remained there one and a half years in the service.

Falling in with the late Prof. H. S. Bennett, then a student at Oberlin College, he matriculated at Oberlin in 1857. While taking a course there he paid his way by working as a carpenter. His graduation was with the highest honors of his class, and while in the institution he invented nearly half the new appliances which were used in the laboratory there.

After graduation Prof. Gray rented a farm near his parents. He took with him as his wife Delia M. Shepard, of Oberlin. The farming did not prosper, as the farmer spent most of his time in electrical research, but he succeeded in inventing a self-adjusting telegraphic relay, and in a short time developed and perfected a type-printing telegraph system by which messages were transmitted upon an alphabetical keyboard and received at the distant end of the wire upon a paper ribbon in Roman characters. The Gray's Printer was very extensively used for short distances in the United States until it was superseded by the Bell telephone. He also invented at that early date an annunciator for use in elevators. In 1869 he formed the firm of Gray & Barton in Cleveland, which was later moved to Chicago, and became incorporated as the Western Electrical Manufacturing Company.

In 1873 he accidentally discovered that musical sounds could be transmitted by wire.

Prof. Gray's attention was engaged with his har-

monic system for the electrical transmission of musical tones over wires, and also in utilizing such tones by the use of analyzers for the simultaneous transmission of several messages. In Detroit in 1874 an electrical concert was performed before a delighted audience in the opera house, upon Gray's harmonic organ, various tunes being played upon his electrical keyboard in Chicago, and were electrically conveyed over *one* telegraph wire to the organ in Detroit, the distance being 310 miles.

About this time he became convinced that the tones of the human voice could be electrically reproduced at a distance over a wire, and had so far advanced in his study of the subject that on the 14th of February, 1876, he filed a caveat in the U. S. Patent Office for "a new art of transmitting vocal sounds telegraphically," and in his caveat he stated: "It is the object of my invention to transmit the tones of the human voice through a telegraph circuit and reproduce them at the receiving end of the line so that actual conversation can be carried on by persons long distances apart."

On the same day A. G. Bell filed in the U. S. Patent Office a specification claiming "a method of, and apparatus for, transmitting two or more telegraphic signals simultaneously along a single wire by the employment of transmitting instruments, each of which occasions a succession of electrical impulses differing in rate from the others; and of receiving instruments each tuned to a pitch at which it will be put into vibration to produce its fundamental note by one only of the transmitting instruments." Upon this application were founded the claims of the Bell telephone.

In 1878 Prof. Gray received the grand prize at the Paris Exposition, and was also given the degree of chevalier and the decoration of the Legion of Honor. At the electrical exhibition in Paris in 1881 he was again honored with a gold medal. By Oberlin College he was given the degree of A. M. and by Ripon College that of Ph. D. He also held the degrees of Sc. D. and LL. D., was a member of the American Philosophical Society and the Institution of Electrical Engineers of London.

Resignations and Appointments.

Mr. H. G. Crowe, manager of the Postal office at El Paso, Tex., having resigned, his place has been filled by Mr. N. De Bree, formerly manager of the Postal at Toledo, O.

Mr. W. H. Roland, formerly of Norfolk and Richmond, Va., has been appointed manager of the Postal office at Danville, Va., vice Mr. E. W. Crew, who has been transferred to Richmond.

Recent New York Visitors.

Mr. W. W. Splane, superintendent of telegraph of the Standard Oil Company, Oil City, Pa.

Mr. H. D. Reynolds, superintendent of the Postal Telegraph-Cable Company at Buffalo, N. Y.

TELEGRAPH AGE should go regularly to every one interested in the telegraph. Write for sample copy.

CABLE MANUFACTURE IN THE UNITED STATES.*

BY WM. MAVER, JR.

(Continued from page 37.)

When thoroughly mixed, the rubber compound is ready for placing over the wire. This is done in two general ways; first, by the use of insulating machines, somewhat similar to the machines used in making rubber tubing. In the second method the compound is formed into a strip which is placed over the conductor. In the latter process the wire is rolled off a drum or reel, and passes through a guide to and between a pair of grooved wheels, where the rubber strip is lapped closely around the wire, the pressure causing the edges of the strips to adhere, and at the same time the surplus rubber is removed by suitable cutting edges on the grooved wheels. This produces a seam in the insulation.

The operation of the insulating machines used in the first-named method is virtually as follows: The prepared compound is fed by an attendant into an opening in the machine; a worm draws the compound towards the die through which a wire is passing, and the wire is covered with the compound to the thickness desired, this being regulated by the excess of diameter of the die over the diameter of the wire. The compound is maintained in the desired plastic condition while in the machine by suitably arranged water jackets, the temperature of which is governed by valves which admit steam or cold water. The rate at which the wire may be covered in this way depends largely on the size of the wire and the thickness of the covering, which is termed the "wall." This method produces what is termed a "seamless" insulation. The wire, while being drawn through the die, is held by guides directly in the center of the die to insure an equal distribution or centering of the compound over the surface of the wire. The conductor, after issuing, covered, from the insulating machine, is drawn along a table through powdered talc, a distance of forty feet or fifty feet, to a drum, upon which it is carefully coiled. The wire thus covered may then be taped prior to vulcanizing, or it may be vulcanized without taping, but in the largest sizes of cables it is customary to first tape the insulated wire.

The taping apparatus consists of a revolving disc on the face of which a reel, holding the tape, is suitably supported. The insulated wire or cable passes through a sleeve in the center of the disc, and as it does, the reel, in the act of revolving with the disc, wraps the tape spirally around the cable. The latter passes from the iron take-up drum to a reel, and is then ready for vulcanizing. The process of vulcanizing the compound consists in placing the wire and reel in an oven, where it is subjected to a steam or dry heat at a temperature of 250° F. to 300° F. Steam heat is preferred by many manufacturers as giving the best results. Much care is required in the process, and the most favorable temperature and the length of time required to bring the compound to the desired degree of hardness and

tenacity are matters of experiment. They vary with different compounds.

At this point the manufacture of paper-covered cables may be considered. This consists essentially of winding strips of manila paper in reversed layers to any desired thickness over the conductor. When the conductor is covered it is wound on a suitable reel, which, with the conductor, is placed in a "bake" oven, where it is subjected for hours to a temperature sufficiently high to drive all the atmospheric moisture out of the paper. The oven in which this baking is done is tightly sealed, except at a vent at the top. An attendant, by holding his hand above this orifice, is able to tell when the drying has proceeded sufficiently far by the nature of the air which passes out. After proper drying, the reel and conductor are immersed in a vat of boiling resin oil, often termed London oil, and as the baking process has rendered the paper exceedingly hygroscopic, it absorbs the oil with avidity.

Formerly the paper was placed over the wire as tightly as possible, but this plan has been abandoned for several reasons, one of them being that imparted too great rigidity to the completed cable, with the result that the cable could not be bent without breaking the insulation. Further, it retarded the heat in the bake oven from reaching into the inner layers of the paper to such an extent that the outer layers were injured by too long exposure to the heat of the oven. Again, when the paper was put on under strong pressure, the compound could not readily penetrate to the inner coils, and as the ability of such cables to resist high electrical pressure is largely due to the presence of the oil, the importance of this latter point is obvious. By placing the paper layers more loosely over the conductor the layers slip easily over one another when the cable is bent, and the heat and the oil more readily penetrate to the inner layers, thereby improving the insulation resistance and increasing the pressure-resisting quality of the covering.

The conductors thus insulated are now ready for bunching into cable form. For the high-tension cables here particularly referred to three insulated conductors are usually employed. These are laid up in a strand, or spirally, and are taped, the interstices being filled in with jute, after which the conductors are ready for lead-covering. In other instances the conductors are bunched, and a "jacket" of paper strips or rubber compound, as the case may be, is put around the conductors thus bunched. This latter method is sometimes termed "split" insulation, because of the fact that the insulation is divided between the jacket and the insulation over each conductor.

All cables intended for use in underground conduits in cities are now lead-covered to protect the insulating material from destruction by the acids, alkalis, etc., found in such conduits. In the case of paper or fibre cables it is absolutely necessary that they be covered with lead to protect them from moisture in the underground conduits. Rubber cables are, of course, moisture-proof, and if nothing but water were to be encountered in the conduits they would not require to be lead-covered. Rubber immersed

*Abstract of an article on "Electrical Cables for High-tension Service, How They are Made and Tested in the United States," in Cassier's Magazine.

in salt or fresh water appears to be imperishable, barring mechanical injury.

The lead-covering of the cable is an interesting process. The framework and the other parts of a lead-covering machine are of massive construction to withstand the heavy pressure which is applied in putting on the lead casing. The pillars of the frame are of solid iron about ten inches in diameter. The working parts of the machine are a solid iron ram about fifteen inches in diameter operated by hydraulic pressure. The ram passes down several feet into a vault in the ground, the hydraulic pressure being applied at the lower end. The molten lead is poured into a hollow cylinder. The lead ram, or plunger, of solid iron, five inches in diameter, is rigidly bolted to the framework, its lower end fitting snugly into the receptacle in the cylinder. As the die block must be changed to suit the size of cable to be lead-covered, the frame is so arranged as to permit of its easy removal. There is a curved opening in the die block which reaches to the guide through which the cable passes. The die block rests on the top of the lower ram, and the cylinder rests on the die block, in which respective positions they are held by bolts.

(To be continued.)

Mr. Mason and the International Association of Municipal Electricians.

Since returning from Charleston, S. C., where he read a paper on "The Progress and Needs of the Fire and Police Departments," viewed from an electrical standpoint, before the "League of American Municipalities," a paper which has attracted a good deal of attention, Mr. F. C. Mason, Superintendent of Police Telegraph, of Brooklyn, N. Y., has received a number of requests from the Mayors of different cities for a copy of his paper and rules governing municipal inspection and installation. At the meeting of the International Association of Municipal Electricians, held in Pittsburg, Pa., last September, a committee was appointed to draft a set of rules for municipal inspection and construction, to be presented at the next meeting of the Association, which will be held at Niagara Falls in September, when this subject will be the principal topic for discussion, the object being to secure uniformity in this work as far as possible throughout the United States and Canada. In order to promote this laudable design, Mr. Mason requests all municipal electricians or other city officials having a code of rules governing this work to forward him a copy, so that the Committee may have abundant material from which to select, and, if possible, improve upon.

The Executive Committee of the International Association of Municipal Electricians will meet at Niagara Falls during February and complete arrangements for its September meeting, fixing the date and perfecting the necessary hotel arrangements, etc. All members of the Association are invited to attend the meeting of the Executive Committee, the exact date of which will be announced later.

Signalling Under the Sea.

Prof. Elisha Gray, the inventor, and Arthur J. Mundy, of Boston, Mass., have after more than two years of experiment and study invented delicate machines with which to transmit submarine signals. By means of the apparatus already constructed messages have been transmitted and received on board a steamship twelve miles from the signal boat. The inventors say that the submarine boat Holland would not be able to surprise warships equipped with the receiving or hearing instruments, for the reason that the working of the Holland's machinery could be detected while she was still some miles away. The members of the United States Lighthouse Board have had the plan explained to them, and all, from Rear Admiral Higginson down, are of the opinion that the system would be of value to the lighthouse service. It could also be used to announce the approach of ocean steamships to port.

The idea first occurred to Mr. Mundy while sitting on the deck of a Mississippi River steamboat shortly after Dewey's victory in Manila Bay. He sat down and wrote a long letter to Professor Gray, who was so impressed with the idea that he left his home in Chicago and has been in Boston ever since working with Mr. Mundy to make the scheme a success. Every schoolboy knows that if two stones are cracked together under the surface of the water a sound is produced which may be heard under water for a long distance. This simple fact suggested to Mr. Mundy the possibility of a signalling system by means of which ships at sea might communicate with each other, or with stations on the shore, or by which warnings might be sent to ships from the shore in times of fog or darkness. The idea was communicated to Professor Gray, who undertook the task of providing the necessary mechanical devices for carrying it out. Work was begun in July, 1898, and has been steadily prosecuted ever since by both Professor Gray and Mr. Mundy. As a result of their joint labors a practical test was made on the last day of the century, which is described in the following statement:

"Boston, December 31, 1900.

"We, the undersigned, hereby certify that we have this day heard the submerged bell (struck electrically from the experimental station on board the Sea Bell) through the electrical receiver (submerged from the deck of a steamer engaged for the purpose), at distances of one and a half, four, eight and twelve miles in the open sea. At one and a half miles the sound of the bell was heard very loud and very distinctly; at four miles the sound was quite as distinct and almost as loud as at one and a half miles; at eight miles the sound was quite as distinct as at one and a half miles and almost as loud as at four miles; at twelve miles the sound was heard at times quite distinctly and at times somewhat feebly. Even at twelve miles the sound received was sufficient to give a practicable warning signal. The bell was also heard in the forehold of the steamer, without any receiving apparatus whatever, at a distance of one-quarter of a mile so loud that it seemed to be right alongside the ship, and at a distance of one and a half miles it was heard

faintly but unmistakably, in the same position in the hold and without any apparatus for detecting sound."

The statement is signed among others by Henry M. Whitney, Commander Arthur P. Nazro, U. S. N.; Prof. Wallace C. Sabine, of Harvard; Prof. William Y. Allen, Prof. Elisha Gray, Arthur J. Mundy, Henry M. Soule, Capt. E. Baker, of the steamer H. F. Dimock, and A. P. Bartow, Master U. S. S. Mayflower.

The experimental boat, the Sea Bell, was built last summer by the inventors for the purpose of enabling them to make a practical test of their theories. Very little has been known heretofore about the action of sound waves in the water, experiments in acoustics having been made principally in the atmosphere. Before building the Sea Bell the inventors made many experiments with sound in the water, using as sound producers explosives, water whistles and other devices. They finally selected a bell as the best instrumentality for producing the sound. Accordingly the Sea Bell is equipped with an 800-pound bell, such as is used for fog signalling in the atmosphere. The current for supplying the necessary power comes from a small dynamo driven by a six-horse power gasoline engine. The bell is lowered through a well hole directly in the center of the boat until it is twenty feet below the surface of the sea. By an ingenious mechanism it may be rung continuously just as a church bell is tolled, or it may be made to ring any desired number or numbers at the will of the operator, who is thereby enabled to send intelligible messages, each letter of the alphabet being represented by a number. It is obvious that instead of suspending a bell from a boat it may be suspended from a buoy, and anchored under water of any depth at any distance below the surface. In such a case the current for operating the clapper would be brought to the bell from the shore by means of a submarine cable.

This much for the transmitting station, which produces the sound. The problem of picking up the sound thus produced from the depths of the sea is another story. The inventors have devised a great variety of receivers, operating pneumatically and electrically and mechanically, and have carefully tested their relative efficiency. The simplest way to receive the sound on board ship is to go below in the hold of the vessel as close to the keel as possible, without any apparatus whatever, and listen. At a distance of a mile or more the sound of the bell may be distinctly heard by the unaided ear. It comes through the water and passes through the sides of the ship into the atmosphere of the hold, and is there recognized by the ear. If one end of a wooden rod is placed against the skin of the ship, the other end being placed against the ear, the sound is heard at even a greater distance. A common tin ear trumpet, such as used by a deaf person, screwed on the end of a piece of gas pipe, the mouth of the trumpet being sealed by a tin diaphragm, and submerged six feet under water, enables the observer at the upper end of the pipe to hear the submerged bell at a distance of three miles.

For greater distances the inventors have constructed an electrical receiver, by means of which the bell has been heard distinctly at a distance of twelve miles. The submerged end of this receiver may be lowered over the side of the ship or attached to it on either side of the bow, under the water line, like a pair of ears. The submerged part is connected by means of an ordinary telephone receiver, which may be carried to any part of the ship, say the pilot house, where the navigator can listen for the sound of the bell. Professor Gray has devised an improvement for the electrical receiver by means of which a large gong will be rung automatically in the pilot house, or any other part of the ship, whenever the submerged bell is rung. That is to say, the gong rings sympathetically, following the bell, stroke by stroke, there being no connection between them other than the sound waves travelling through the water from the bell to the gong.

Electric Building Loan and Savings Association of New York.

The annual meeting of the Electric Building Loan and Savings Association was held January 11, at 253 Broadway, New York. The former board of officers were re-elected for another year, and are as follows: Col. A. B. Chandler, president; F. W. Jones, vice-president; E. S. Butterfield, secretary; T. L. Cuyler, Jr., treasurer, and J. B. Sabine, attorney. Directors: W. H. Baker, Clarence Mackay, George Clapperton, E. C. Plait, G. H. Usher, T. E. Hurdus, T. E. Fleming, E. Reynolds, M. M. Davis, C. Shirley, A. M. Kemp, J. F. Skirrow, J. F. Cleverdon, G. W. Blanchard, and E. G. Cochrane.

The financial condition of the association is shown in the semi-annual report for the six months, ending January 1, 1901:

ASSETS.

Loans on bond and mortgage	\$68,156	35
Loans on stock	1,050	00
Real estate	20,872	82
Interest and premium due	306	68
Real estate sold on contract	4,077	48
Erie railway bonds	1,868	73
Insurance premium advanced	10	00
Cash in bank	1,093	73

- \$97,435 79

LIABILITIES.

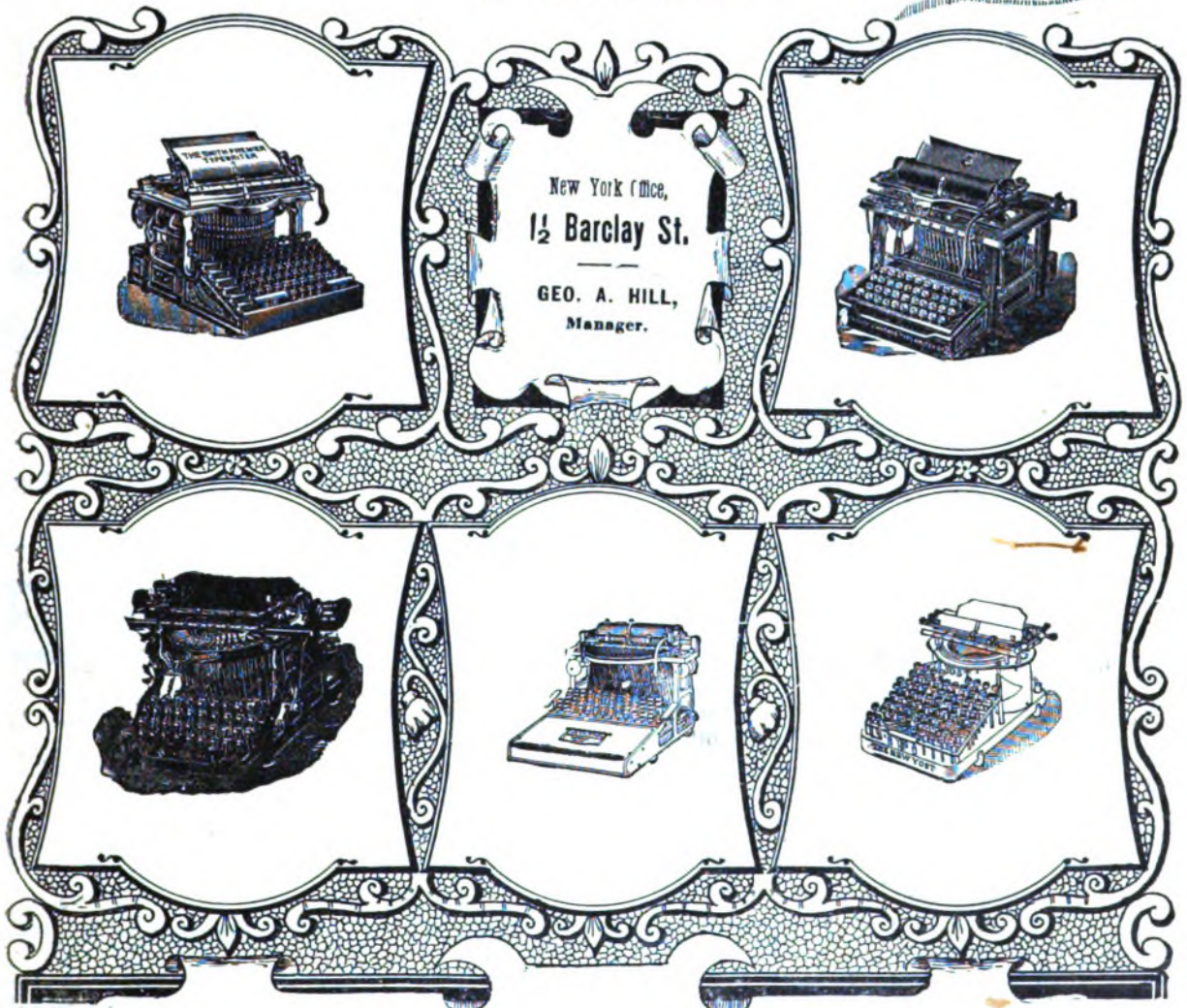
Due shareholders, including dividends credited to date	\$91,805	68
Dividends due shareholders on paid-up stock	599	64
Suspense account	374	97
Bills payable, borrowed money	3,000	00
Contingent fund	1,655	50

\$97,435 79

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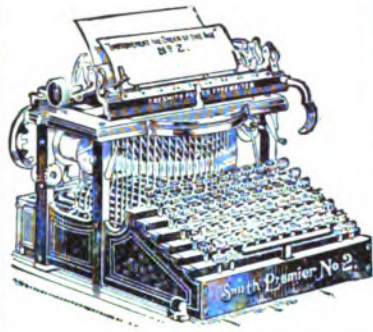
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CHANGES OF ADDRESS.—The address of a subscriber will be changed as often as desired. In ordering a change of address the old as well as the new address must be given.

NEW YORK, February 1, 1901.

Queen Victoria.

The reverential hush that has fallen upon the civilized world in the death of Queen Victoria is one of the most impressive episodes in the history of mankind. In it we recognize the love and esteem which goes out to noble womanhood and high-minded statecraft, marked with a spontaneity never before witnessed, and acclaimed irrespective of national boundaries. We speak of the various "ages," so called, covering the periods of certain great lives and times, as that of Pericles and of the Renaissance, but the Victorian era will always stand out pre-eminently as an epoch of moral, intellectual and physical development, in which the principles of liberty have found grander vindication, and in which the pure, lofty and able personality of the Queen has contributed its own strong impress. England mourns the loss of her Queen, yet in a sense Victoria was the Queen of all lands.

A Telephonic Episode.

The Telephone, Telegraph and Cable Company of America, which was incorporated in November, 1899, with a capital of \$30,000,000, and which was formed for the declared purpose of establishing a great telephone system independent of the Bell Telephone Company, purchased during 1900 a controlling interest in the stock of the Erie Telegraph and Telephone Company, the chief subsidiary companies of the Bell system.

Lately the control of the Erie company has reverted to the Bell telephone interests, the motives underlying the transaction, however, and which have excited much speculative comment, being wrapped in considerable mystery. There have been financial complications, and apparently the holding of the big Erie company involved a too complex condition of affairs. The re-transfer of stock was

conducted by a banking syndicate, and the present situation, including the exact status of the Erie company itself, is such that a clear perception of just how matters stand is difficult to arrive at.

A new element, however, has come into the direction of the Erie company, and Mr. Charles J. Glidden, its president, the man who was one of its organizers and who has been instrumental in building up the concern from its infancy, successively filling the positions of secretary, treasurer, vice-president and president, has resigned. Mr. Glidden's place has not yet been filled, but it is said, as a director of the company, he will in that capacity continue temporarily to superintend its affairs.

Pupin Patents Sold to American Bell Company.

Pursuant of the policy followed by the American Telephone and Telegraph Company in securing control of valuable telephone inventions, this company has recently concluded negotiations with Dr. Michael I. Pupin, of New York city, resulting in the sale of his patents covering improvements in long-distance telephony to the corporation. This invention, it is asserted, solves the problem of ocean telephony, and will permit of transmission of intelligible speech over long-distance land lines of almost any desired length. Dr. Pupin, who is adjunct professor of mechanics at Columbia University, says the Scientific American, has been at work on the invention for five years, and read a paper entitled, "Telephony Over Cables and Long-Distance Air Lines," in which he discussed his investigations at some length, before the American Institute of Electrical Engineers, at Philadelphia, May 18, 1900. United States letters patent Nos. 652,230 and 652,231 were granted to him on June 19, 1900, the title of the patents reading, "Art of Reducing Attenuation of Electrical Waves."

The problem that Dr. Pupin set out to solve was the reduction of the retarding influences on an electrical circuit caused by induction and capacity, and the balancing of these influences by distributing inductance and capacity through the circuit. This solution had been attempted by other experimenters, but its successful realization awaited the investigations of Dr. Pupin. He arrived at his conclusions by complex mathematical deductions, based on the consideration of the physical analogy between the case of a vibrating string and that of an electrical conductor transmitting waves, in which he determined the dimensions of inductance coils and condensers necessary to add to a given circuit, so as to produce a practically "distortionless" circuit.

After securing his patents here and abroad, last July the inventor offered his discovery to the American Telephone and Telegraph Company. The company immediately bought an option on the invention, extending to January 1, 1901. Under Dr. Pupin's direction an experimental line was constructed from Bedford Station on the Harlem railroad, partly under water, to New Bedford, Conn., thence to Albany and on to Pittsburg. Where the line ran overland the coils were placed

at intervals of about two miles, and were enclosed in glass insulators on the poles. The experiments were very satisfactory to the officers of the Bell Company, and before the option expired the contract for the purchase of the patents was closed, according to the terms of which it is stated that Dr. Pupin receives about \$400,000, and in addition an annual royalty of \$15,000 during the life of the patents.

It is believed that the invention would not have been purchased if the question of ocean telephoning had been the only one under consideration, as its great value in the operation of long land lines is probably most important to the company at the present time. Dr. Pupin announces that by the use of his system a saving of about \$120 a mile can be effected. The coils which will be used with the telephone wires and cables will be distributed at intervals of a mile on land lines, and at intervals of an eighth of a mile on cable lines. It is announced that the first utilization of the system for ocean work will be on a cable that the American Telephone and Telegraph Company is to build between Florida and Cuba for the United States Government. Steps are also believed to be in progress looking toward the use of the system on a transatlantic telephone line.

MORE SUBMARINE CABLES.—A cable dispatch from Berlin, of January 19, says that the project of a net of cables to cover the world is being diligently pursued by Germany, and is most actively furthered by the Emperor, who made some significant utterances on the subject to Privy Postal Councillor Strecker recently. The latest shape of the project, so far as the Far East is concerned, is as follows: Germany and the Netherlands to jointly lay a cable, which will go through the Dutch Indies, touching at the Natuna Islands, Billiton, Palembang, Batavia, Macassar, Amboina, German New Guinea and the Carolines, with a central point at Shanghai, thence branching from Kiao-Chou easterly to Japan and America. The Dutch Government will lay the cable through its own colonies, and Germany will do the rest. The financing of this project is about concluded in principle. The plan of General von Podbielski, the Imperial Postmaster-General, for gradually raising the annual appropriations to a maximum of 6,000,000 marks in 1920 has been approved by Emperor William. But if private companies, with a State subvention, will undertake the work, General von Podbielski will not object.

DOMINION CABLE INQUIRY.—It is learned in Ottawa that the Imperial Government will appoint a committee to inquire into the question of cable communication. The investigation will be a very comprehensive one, and will not only deal with the present cable services in British territory, and the rates charged, but also will ascertain if it is possible to establish new lines with advantage. The inquiry will begin in February.

TELEGRAPH AGE is convenient for reference.

THE TELEGRAPH.

BY PATRICK B. DELANY.

(Continued from page 36.)

In 1846 Alexander Bain, of Edinburgh, conceived the idea of punching telegraphic characters in a paper tape, and then transmitting them by passing the tape through a machine which automatically made contacts through the holes. The message was received on a paper tape moistened with chemicals. An iron pen connected to the line resting upon the top of the tape passed the arriving signals through the paper to a drum over which it was drawn continuously, the drum being connected to earth, so that the pen, paper and drum formed part of the circuit. The discovery of the electrolytic action involved in this operation is said to have been made by Dr. J. Redmond Cox, of Philadelphia, in 1810, and afterwards amplified by Davy and others. This idea of stenciling messages on tapes laid the foundation for the present Wheatstone automatic system.

Bain's system was defective in all its main features. The perforator was crude, and his transmitter and all those used in subsequent attempts could not be relied upon to make contacts through the holes in the tape. The records on the receiving ribbon for high speeds on short lines, or moderate speeds on long lines, were, owing to retardation, run together, so that translation was difficult and liable to error. These drawbacks have all been overcome, one by one, until recent demonstrations by the writer before scientific bodies, over artificial lines and over regular lines in actual practice, have shown that 4,000 words per minute can be plainly recorded from New York to Philadelphia, 1,000 words per minute New York to Chicago, and 200 words per minute New York to San Francisco direct, without repeaters, over a single wire. As an evidence that the speed of this system is only limited by the line, and is in no way restricted by the apparatus, 8,000 words per minute have been plainly recorded over an artificial circuit of 250 ohms, 2 microfarads capacity, with 110 volts. This, with proper computation of letters and signals involved, amounts to over 2,500 impulses per second plainly recorded, the sending tape passing through the machine at the rate of eight feet per second.

With such a system all the mails between any two points in the country can be telegraphed over one or two wires.

The train time will ere long be eliminated from correspondence and the Post Office will be used for collecting and delivering these "electropost" communications.

Postal telegraphy by the Government may, owing to political prejudices, be delayed, but utilization of the postal facilities locally in co-operation with private enterprise for long-distance transmission, will accomplish about the same results. Nor is any special legislation thought to be necessary to bring this about. The Postmaster-General, having authority to contract with railways, steamships, tube companies and others for transportation facilities, surely has the power to contract with a telegraph company to deliver to the Post Office at one point preferred

letters or "electro-post" communications handed to the company at another point, enveloped, addressed and duly stamped, at a fixed price, and within stipulated limit of time. In this way a letter filed with the company at Chicago would be in the carriers' pouch in New York in less time than it would take to transport it from the Chicago Post Office to the train.

Liberal subsidy for the saving of time in mail carrying has been the policy of the Government from the beginning, as shown by the evolution from postboy and packet boat to the cannon-ball express and ocean greyhounds. An hour's reduction in the time of a thousand-mile run on land or an ocean trip commands the preference of the mails by the company achieving it, and, both locally and lengthwise, no expense is spared to expedite letter conveyance. A 10-cent stamp is used to hurry delivery so as to gain perhaps half an hour; sub-offices convenient for distribution are established without regard to expense, incoming steamers are boarded down the bay by sorters, and an army of mail distributing clerks are constantly on the go all over the country for the purpose of saving a little time.

Private enterprise will soon appreciate that this mine of business, amounting to about \$75,000,000 annually, is worth competing for, setting the advantage of practically all time saved against the difference in expense. When the public realizes that the post offices throughout the country are but half an hour apart, and that replies to letters may be received in the same day for a charge not much more than the extra delivery stamp each way, it will be more than strange if letter transport by train, for business purposes at least, does not stop altogether.

A few substantially constructed wires over leading routes, taking in all cities of 25,000 inhabitants and over, leaving to the present methods the broker and exchange business, but using the Post Office, its trolleys, tubes, automobiles and bagmen to collect and deliver telegraph letters, will work an amazing change in correspondence in a short time. The Post Office cannot complain so long as it gets its postage at each end and without the expense of intermediate transportation.

This revolution cannot come by any electro-magnetic system. The Morse will continue to hold its place for speculative exchange business and train dispatching, but the great bulk of ordinary business will be carried by the system admitting of increase in volume and decrease in cost. Further improvements in electro-magnetic telegraphy need not be looked for. The limit in multiple and "phantom" circuits over a single wire has been reached. In fact, deterioration may be looked for, owing to the spread of trolley and power currents through the earth. In many notable instances already quadruplex workings have been seriously impaired, it being next to impossible to maintain a balance against a change of potential varying from zero to 60 volts, which is not infrequent between working points. It is useless to talk of increasing speeds by more sensitive apparatus, as has been proposed; the present instruments are much too susceptible to the stray currents which find their way into lines at every ground connection. Present indications

are that ere long all balanced systems of telegraphy must be provided with metallic circuits or given up.

The chemical automatic system employs no electro-magnets, has ample margin for recording over and above all variations from extraneous causes, and is only limited in speed to the carrying rate of the wire itself.

The telephone is surely destined for the greatest domesticity, locally. It will be "a household word," but for long distance it must always be an emergency means, on account of the cost. Sixty words per minute (a fair average) or 30 words for each wire, will not admit of much cheapening. The time is coming, however, when the telephone and the machine telegraph will be associated in a way that will appeal to every telephone subscriber extensively engaged in business. Leading concerns will have a machine telegraph set which will enable them to shoot into a correspondent's office, similarly equipped, 1,000 words or more in a minute, to be transcribed at leisure by the typewriter, the message or letters having been prepared by the sender's typewriter, so that any business concern or newspaper may have private electrical mail facilities as many times a day as they wish to call up, and have ample opportunity for conversation within the telephone time limit as well.

These advances in cheap and general telegraphy, together with the spread of the uses of the wireless system in its legitimate field, where wires are impracticable, will all come about while the century is still young. The evidences being already here, prophecy has no place.

What the centenarian of a hundred years hence may see a prophet should leave to his son to prophesy. In the way of telegraphy, doubtless, the ships amain will hold converse with each other, and correct their chronometers with the last observation a hundred miles away. They will be in constant communication with the shore through the air or by wires on the bed of the ocean, but as the trip from the Hook to the Lizard will be done in a day, and probably without touching the water, only the over-anxious will want a dispatch. Communication with Mars has already been pre-empted, and *seeing* by electricity may be no longer visionary. Our five senses may, forsooth, all be "wired" wirelessly.—*Electrical World and Engineer.*

THE GROWTH OF THE TELEPHONE.—The American Telephone and Telegraph Company, of Boston, Mass., reports its output of instruments for the year ended December 20, 1900, as follows:

	1900.	1899.	1898.	1897.
Gross output.	639,766	661,009	354,559	241,271
Returned.	280,703	206,654	148,834	92,867
Net output.	359,063	455,255	205,725	148,404
Total outstanding Dec. 20.	1,939,568	1,580,505	1,125,246	922,253

One of the comic papers the other day perpetrated a joke which will be appreciated by all participants in strikes. One working man asked the other: "How about your strike? Was it a success?" "Oh, yes," replied the individual addressed, "it was a howling success; we all got our jobs back."

The Telegraph in the Nineteenth Century.

BY WM. MAVER, JR.

The development and growth of the electric telegraph during the nineteenth century is the history of its development for all previous centuries, for prior to the opening of this century there was, strictly speaking, no electric telegraph. Indeed, it may be said without much exceeding the limits of accuracy that the history of the development and growth of the electric telegraph for the last two-thirds of this century would contain nearly all that is important concerning that art.

Telegraph systems there were before the electric telegraph. There were telegraph systems even before the Christian era. Writing in 300 B. C., Polybius describes a telegraph system then in use for military purposes. This was a visual telegraph system in which torches were set upon a wall or walls and a certain number and position of the lights were arranged to represent the letters of the Greek alphabet. By changing the position and the number of the lights to correspond to the pre-arranged plan, it is easy to see how words could be spelled out at one station and received at another. Analogous to this system was the semaphore visual telegraph devised by Claude Chappé, of France, in the latter years of the eighteenth century, and which was, in a more or less modified form, in full vogue throughout Europe in the first half of this century. This system, as its name indicates, "a sign I bear," employed a post and swinging arms, as do the familiar semaphores to be seen along every railway to-day, but the Chappé semaphore was a different appearing arrangement from the ordinary railway semaphore. Thus, there was a cross-arm, about 14 feet long, on the top of the post. At each end of this cross-arm a shorter arm was pivoted, and by a system of pulleys and ropes these arms could be placed in many different positions. The letters of the alphabet were allotted certain positions of the arms, and thus one familiar with these positions could transmit or receive messages by the proper manipulation of the arms. This system, like all such visual systems, was quite limited as to the distance to which signals could be transmitted between any two stations, and in times of fog could not be operated at all. It is told that during the peninsular wars, when Wellington was fighting the French, a message was received in London by the Admiralty semaphore system, stating "Wellington defeated." A fog intervened, and no further information could be obtained. When the mist cleared, the consternation created by the receipt of the above news was dispelled by the joyful intelligence that the message should have read, "Wellington defeated the French."

It has been well said of the invention of the electric telegraph that it was not the work of any one man. Perhaps the most that can be said of any one man in this relation is that he was the inventor of a particular system of electric telegraphy. The early and late history of this art shows that its advances have invariably followed upon the discovery and announcement of laws and facts of

electricity and magnetism. It had, for instance, been known for a long time that many light substances were attracted by an electrified body. Availing of this knowledge, it was suggested as early as 1753, in the Scot's Magazine, that if 26 wires were provided, one for each letter of the alphabet, and at the far ends of the wires light pith balls were suspended, messages could be sent over the wires by touching the near end of a wire representing a given letter by a frictional electric machine, when the pith ball at the distant end of the wire would be attracted. This idea was realized in 1774 by Lesage, who constructed a short experimental line of 24 wires in that year.

The discovery by Volta, in 1800, that electricity could be generated by chemical means was followed by the discovery by Nicholson and Carlisle that water and certain salts could be decomposed by the electric current. Acting upon this knowledge, Sömmering, of Munich, in 1808, devised and operated experimentally an electric telegraph system employing also 25 to 35 wires for the transmission of letters and numerals, in which this principle was employed, the voltaic current being caused to decompose water held in small glass tubes at the remote terminals of the wires. The bubbles of hydrogen and oxygen, appearing in certain tubes, indicated the letters transmitted. This was the first telegraph system in which the voltaic current was employed.

Up to this time and for some years thereafter, the effect of an electric current upon a magnetic needle had not been discovered. The impracticability, however, of making a commercially successful electric telegraph in which 25 or more wires between stations were necessary for the transmission of a single message, was evidently apparent even at that early time, for we find Mr. Francis Ronalds, of Hammersmith, in 1816, experimenting with an alphabetical telegraph system in which but one wire was used. In Ronalds' telegraph there was a dial at each station, on which were placed the letters of the alphabet. The dials rotated synchronously. In front of each dial was placed a screen in which a notch was cut, so that as the dial revolved one letter at a time was seen through the notch. Pith balls were connected to the wire at each end. At a given signal the clockwork was started, and as a desired letter appeared behind the notch the wire was charged momentarily with frictional electricity and the pith ball was actuated. The letter at that moment appearing through the opening in the screen was noted, and in that way messages were transmitted. This was the first synchronous electric telegraph. Ronalds offered this telegraph system to the British Government, purposing to build a telegraph system around the entire British coast, but his offer was rejected in the following language: "Telegraphs of any kind are now wholly unnecessary, and no other than the one now in use will be adopted." The one then in use was the visual semaphore telegraph. It may, however, be noted that a subsequent British Government conferred the honor of knighthood upon Ronalds for his scientific work. The incredulity of the British Government at this

early period—1815-1820—as to the value of electric telegraphs, need occasion no surprise when it is known that the semaphore telegraph system was not entirely displaced by electric telegraph systems in Europe, or even in this country, until the middle of the century.

The next, and up to that time the most important, practical development of the electric telegraph followed ultimately upon Oersted's discovery, in 1820, of the action of an electric current upon a magnetic needle; namely, that the needle was deflected to the right or left, according to the direction of the current in a wire held parallel to the needle. Taking advantage of this discovery various "needle" telegraph systems came into existence, and were at one time extensively, and it may be added, exclusively, employed in Europe and Great Britain, and, indeed, still are in limited use there. These "needle" systems, as intimated, were operated on the principle just referred to. A magnetic needle was pivoted in the center of a coil or coils of wire, constituting in effect a galvanometer, and a pointer which was attached to the needle moved in front of a dial. Prearranged deflections of the pointer to the right or left signified a certain letter of the alphabet. The deflections to the right or left were produced by sending over the wire or wires, pulsations of current of one polarity or alternations of both, as required by the letter to be transmitted: The first of these needle telegraph systems was devised by Schilling, of Russia, who employed five needles and one wire for each needle. Gauss and Weber, at Göttingen, in 1833, devised and operated an experimental needle telegraph system, using but one wire on a metallic circuit, three miles in length.

Prior to this time it was supposed that a metallic circuit was necessary when the voltaic current was employed, although in many of the early experiments with frictional electricity the earth had been used for this purpose. Shortly thereafter, however, in 1837, Steinheil, of Munich, experimenting in conjunction with Weber, discovered that the earth could be used as a return wire for a voltaic current. This discovery of Steinheil's was of vast importance in the subsequent development of the electric telegraph, as must be any discovery or invention that will at one stroke, so to speak, practically double the number of existing wires.

Curiously, too, the notion had prevailed up to this period that it was necessary to use wires insulated throughout their length, even when supported on poles, to keep the electricity on the wires. The expense of thus insulating the wires was naturally considered a serious obstacle to the extension of the electric telegraph. Weber, however, removed this obstacle by the important discovery that it was not necessary to insulate aerial wires except at the points of support. Another deterrent to the employment of voltaic electricity in electric telegraphy was the fact that up to 1836 a constant primary battery had not been invented. The invention by Daniell, of Edinburgh, of a constant zinc-copper battery in that year, and Sturgeon's previous device of amalgamating the zinc,

therefore very materially aided the advancement of the electric telegraph.

In England, Wheatstone and Cooke were also assiduously at work about this time, 1835 to 1840, upon needle telegraph systems, and to these inventors belong the credit of having pushed to a commercially successful conclusion the first electric telegraph system. Not that they were the first inventors of such systems, but that they succeeded in working out the details necessary to provide a simple and economical system, which went into very extensive use in Great Britain, especially in the railroad service. These gentlemen evidently had the commercial combined with the inventive talent, and took the wise precaution to patent their various devices in electrical telegraphy, for which it is recorded they received from the company formed to exploit their invention over \$800,000.

Thus far the discovery of Sturgeon, of England, in 1824, that an electric current flowing in a coil of wire surrounding a piece of soft iron would magnetize the iron, and when the current ceased the iron would lose its magnetism, had not been availed of in electric telegraphy, although Booth, in Dublin, in 1830, and Henry, in 1831, had shown that signals could be transmitted by means of the attracting power of an electromagnet upon its armature. It remained for S. F. B. Morse, of New York, to put into practical operation the electromagnetic recording telegraph which bears his name, in which the armature of an electromagnet produced on a strip of paper dots and dashes representing the letters of the alphabet, the electromagnet itself being operated by the opening and closing of a key in the line circuit.

The first Morse telegraph line was constructed after many discouragements in 1844, out of public funds, between Baltimore and Washington, and was a success. The progress of electric telegraphy into public favor in this country was, however, at first slow. High rates for messages, more or less imperfect service, due largely to poorly constructed lines, and much litigation to preserve the monopoly of the electric telegraph in this country to the Morse interests, were conducive to this slow progress. In 1838 Morse had gone to England to obtain a patent for his invention, but it was refused to him by the Attorney-General, on the score of previous publication, a rather flimsy excuse it would seem, in view of the facts, which briefly were that a statement had appeared in a magazine to the effect that Morse had invented an electromagnetic telegraph. But, a Roland for an Oliver, when Alexander Bain, of Edinburgh, came to this country to obtain a patent for his chemical automatic telegraph, it was refused him on the ground that it infringed Morse's claims. Bain employed a device for perforating long and short holes in a strip of paper, the latter being used for the transmission of long and short pulsations of current over the wire. At the receiving end he employed a strip of paper moistened with a suitable chemical solution, which was decomposed by the passage of current through it, thus producing long and short marks on the receiving paper. He, it is true, used an alphabet of dots and dashes

analogous to that of Morse, but as Morse's most important claim was for an electromagnetic telegraph, and Bain did not employ electromagnetism in any shape in his system, it is not easily seen in what the infringement consisted. Bain, more fortunate here than Morse in London, pressed his claim in the Supreme Court at Washington, and a patent was allowed. It is doubtful, however, if a British patent would have been of much pecuniary value to Morse had he obtained it, inasmuch as, during the life of his American patent, the Morse system was very sparingly employed in Europe or Great Britain, the various needle and dial systems having secured a strong foothold in those countries.

The next important advance in electric telegraphy in this country was due to Royal House, of Vermont, who invented, in 1846, the printing telegraph system, which bears his name. This invention was looked upon at the time as one of the wonders of the age. It was the precursor of the "ticker" and similar printers of to-day, printing its messages on a strip of paper in Roman letters at the rate of 50 to 60 words per minute, as against 20 or 30 words by the Morse system. Dial telegraph systems, due to Wheatstone and others, were also much employed in the middle of the century. These were also known as pointer telegraphs, because of the use of a pointer which, actuated by "step by step" mechanism, passed around the face of a dial, on which were placed the letters of the alphabet, and stopped momentarily opposite a selected letter. Both the House printer and the dial telegraph were believed, in Europe, to give greater accuracy than the Morse system, and if the statement made at the time was true, to the effect that an examination had shown that there was an average of one error in every fifth message transmitted by the Morse system between two important American cities, there was some reason for the belief.—*Electrical Review.*

(To be continued.)

ACCORDED FIRST PLACE.—A contemporary in recording the progress of the century just closed says that in the wide field of invention there are so many claimants for fame that no one perhaps can make a just decision and say who was the greatest inventor of the nineteenth century. The first thought, however, is to give the honor to Professor S. F. B. Morse, the inventor of the electric telegraph, the man who made it possible for men to talk to one another clear round the world, the man who did more to overtake criminals and thereby to prevent crime, than all the detectives who ever lived. Looked at from another side and the case seems to be in favor of Edison, the man who has given us the talking machine, the electric light, the quadruplex telegraph system, the first electric trolley line and a score of other important inventions.

The articles, "Some Points on Electricity," published regularly in TELEGRAPH AGE, are filled with practical information for the up-to-date operator. Send for a sample copy.

Publications.

"PHILLIPS' CODE," by Walter P. Phillips, 9th edition, 69 pages. This unique and efficient guide for the transmission of press reports still maintains its great popularity; bound in flexible leather; price, \$1.

"THE QUADRUPLEX," by Wm. Maver, Jr., and Minor M. Davis, 128 pages, 63 diagrams and other illustrations; treats of the technical side of telegraphy in a manner at once simple, comprehensive and easily understood; bound in cloth; price, \$1.50.

"LIGHTNING FLASHES AND ELECTRIC DASHES," 160 pages, illustrated. An original and sparkling collection of telegraph stories, quaintly descriptive of scenes and incidents that a telegrapher will appreciate and heartily enjoy; bound in cloth; price, \$1, reduced from \$1.50.

"AMERICAN TELEGRAPHY," by William Maver, Jr., enlarged and improved; 600 pages; 475 illustrations; clear, lucid and comprehensive in its treatment of the subject, the ranking work of its kind, and of high practical value to every telegrapher; bound in cloth; price, \$3.50.

"TELEGRAPHERS OF TO-DAY," by John B. Taltavall, 354 pages. This volume, of which but a few copies of the first edition now remain, presents a compendium of illustrated life sketches of over 800 well-known telegraphers who have been prominently identified with the telegraph during the past fifty years; bound in cloth; price, \$5.

"POCKET EDITION OF DIAGRAMS AND HANDBOOK FOR TELEGRAPH ENGINEERS," by Willis H. Jones, 115 pages. 54 full-page diagrams. This book places before the telegrapher a pocket edition of diagrams designed to take the place of the incomplete drawings which nearly every chief operator, lineman and student carries; bound in flexible imitation leather; price, \$1.

"THE TELEGRAPH IN AMERICA," by James D. Reid, 894 pages, illustrated. This book is of marked interest and worth, inasmuch as it contains telegraphic records of great historical value, not to be found elsewhere. There are only a limited number of volumes of this great work now available; bound in full morocco; price, \$7.

Any of the above publications will be sent on receipt of price to any point in the United States or Canada, express charges prepaid. Address J. B. Taltavall, TELEGRAPH AGE, 253 Broadway, New York.

The Pacific Cable Bill.

The movement to secure consideration for the Pacific Cable bill passed by the Senate last session has culminated in the signing of a petition to the Speaker and Committee on Rules of the House, asking that a day be fixed for the consideration of the bill. This bill provides for a Government cable, to be laid to the Philippine Islands, as opposed to the bill providing a subsidy of \$300,000 a year for 20 years for a private cable.

CORRESPONDENCE.

PROPER AMOUNT OF CURRENT.

Editor TELEGRAPH AGE:

Will you kindly inform me in your next issue what is the proper amount of current for a single Morse wire, for a duplex and for a quadruplex; also, what should be the minimum insulation resistance per mile of a wire in the worst of weather. Your reply will oblige,

Yours truly,

Denver, Col., January 10. W. H. S.

[For good, all around service, 150 ohm single line relays should have, at least, 40 mil-amperes of current; neutral quadruplex relays, 45 to 60 mil-amperes; polarized relays, on quadruplex circuits, 15 to 18 mil-amperes for value of the "short end," and polarized relays on duplex circuits, 25 mil-amperes.]

The last question cannot be answered within any satisfactory degree of accuracy. The nature of "escapes" and the causes which conduce towards bringing about the same are too varied to be measured by any one rule.

Some instruments are affected more than others. Polarized relays, for instance, respond to direction of current, through escapes which would completely destroy the usefulness of single line and neutral relays, while the latter class will themselves frequently work better through a heavy escape on one circuit than they will through a slighter one on another. Everything depends upon whether the leak is "constant" or not.—ED.]

RECORDING SALES AT THE STOCK EXCHANGE.

Editor TELEGRAPH AGE:

The recent unprecedentedly heavy transactions in the New York Stock Exchange, culminating in the record-breaking figures of over two million shares on Monday, January 7, have caused some press statements of an erroneous character to be made, reflecting upon the method of collecting sales on the Board room floor for transmission over the tape, and also by implication upon the staff of telegraphers who make these collections. As I occupy an active position among the corps of reporters employed by the Stock Exchange for this arduous duty, I am able to make an exact explanation covering the leading particulars governing the system through which dealings are so recorded.

There are eighteen expert telegraphers distributed throughout the Board room with specific stocks to look after. In noting sales at the opening of business, when the excitement is, as a rule, the greatest, it is difficult to follow the volume of trade.

In the course of a few moments, however, it subsides sufficiently to enable the reporter to confer with one or more of the brokers present, confined in trading to certain stocks, and correctly ascertain what sales had taken place both in respect to parcels and in the aggregate. These particulars are then immediately taken to the distributing reporters, and are promptly sent out over the wires. To one unfamiliar with the evi-

dence of the ticker records in its influences upon people in outside offices, it is well to state that brokers are all eager to have their respective purchases or sales appear upon the tape, to serve as confirmatory evidence that certain transactions committed to their care had been made in reality, and not presumably only.

It will thus be seen that what escapes the watchful eye of an expert reporter, is almost sure to come to light through the reminder of the interested broker, namely, that the trade he was concerned in had not appeared in due time on the tape, and must be printed.

As a matter of opinion, an old member of the Stock Exchange, who is familiar with every working feature of the organization, figures the overlooked transactions of a busy day, not to exceed 1 per cent. of the whole, an estimate shared by many others of equal experience.

The telegraphers engaged in reporting stocks, are necessarily quick and accurate, and to a degree that ordinary work does not exact. They are under the supervision of a superintendent of telegraph, and are unassisted by any messengers or pages, as several newspapers would have the general public believe. The majority of the reporters are among the most skilful telegraphers in the country, and it is not an easy task to replace them when vacancies occur.

New York, January 19. W. A. HENNESSEY.

"6 PIK."

Editor TELEGRAPH AGE:

He was known as "6 Pik" on account of his freak sending. He was manager and operator in a branch office some years ago, and handled a great many messages for Philadelphia, and always sent "6 Pik" for Philadelphia, and also added dots to his 4s and 8s. He was a rapid sender, and when the regular operator was not at the New York end the business was brought down in a bunch to the main office, as there was but one man capable of translating his combinations. In those days such a sender was called a freak, for the operator of that time wrote Morse, taking pride in the correct formation of the characters. In this day of degenerate Morse sending, the tables are turned, it appearing to be the rule instead of the exception for operators to overrun their ps, 6s, 4s and 8s. Another thing is noticeable among this class of senders, namely, words ending with er are almost invariably sent or. The operator who is unconscious of errors in his own transmission cannot have a safe ear for receiving. The dangerous habit is on the increase, and strong measures should be taken to check its growth. These "6 Pik" senders are heard in exchange offices and on cable circuits, and how they manage to escape the yellow envelope is a mystery, if they do. I hope TELEGRAPH AGE will stir the matter up for the mutual benefit of the fraternity and the telegraph companies. Perhaps some reader may be able to suggest a remedy. I hope you will hear from others.

New York, January 21.

C.

TELEGRAPH OPERATORS IN THE PHILIPPINES.

BY F. E. GRAIN.

A most pressing need for telegraph operators has existed in Luzon, Panay, Cebu, Negros, Mindanao, Gimeras and other of the leading islands of the Philippine Archipelago, where Government lines have been put in recently. The linemen have been putting in new lines much faster than the operators can be furnished to supply the stations. Very many of the stations which were fitted up with a view of permanent occupancy have already been abandoned because of lack of telegraph operators. The Government is constantly sending over new men, but not fast enough to meet the requirements, for hardly a day passes that a new station is not opened in some part of the archipelago. Within a very few months the work of connecting all of the islands by cable will begin. The United States cable ship "Burnside" has a considerable portion of this cable aboard, and, with Manila as a center, the cable lines will extend to the most remote points in the Philippine group. At the present time the only islands joined by the cable system are Panay, Cebu and Leyte, which are wired with Luzon. The establishment of the new connections so as to connect all of the numerous islands of the Philippine Archipelago will necessarily call for the employment of additional stations, and of course a telegraph operator in each station, and in some cases, where there is much night work, there must be two operators. The advent of the cable lines also means that there will be additional stations established in the interior of the different islands. At present the island of Luzon is well provided with stations, and the interior can be reached at any time. Panay Island is also liberally dotted with telegraph stations, and the movements of the troops can be known at all times to the department commander. Still there is a severe handicap due to shortage of men on both of these islands. The writer recently met the telegraph operator of San Jauquin, one of the coast stations, going into Iloilo, where he had been ordered to report to take charge of the office at Jaro. There was no other way to get a man for the Jaro station than to close up the San Jauquin station. I stopped over at Tigbauan one night and found the operator ill with fever, and his superior officers were trying hard to get a man to take his place, so as to "relieve" him and permit him to go to the hospital. But none could be had for several days, and, the Tigbauan station being a central point, several branches depending upon it for transmission of messages by telegraph or telephone, the office could not be closed, and the ill operator stuck to his post, until finally a man was secured by closing up an office of minor importance.

The Government is sadly in need of experienced operators, and when the new cable lines are established, the need will be greater than it is at present. There are now, to the knowledge of your correspondent, a number of important offices closed simply for lack of men. One of the reasons

why many men do not enlist for this service is that the pay does not seem to them to be as much as it ought to be.

The pay is indeed low, but it must be remembered that the Government provides everything, including rations, lodging, medical attendance, clothing, etc. The pay of a first-class private in the signal corps is \$20.40 per month. Many operators enter the service in this capacity, although some are not thoroughly qualified, and are obliged to enlist as second-class privates, in which case the pay is a little lower. After a short service, however, the second-class private is usually appointed a first-class private. In a year or so he becomes a corporal, with a slight increase in pay and privileges. In course of time he may become a sergeant, in which case his pay begins to jump upward, and if he passes through the stages to chief operator, he will find that he is drawing a salary of \$40 to \$50 per month, and nearly all clear gain.

The writer has been here about a year in the field, and has met with many operators direct from home, most of whom are glad to get the outing offered as a change from the confinement of office work in their former occupation. Often the new man arrives, and instead of being put directly into an office he is ordered to join the linemen, in which case he usually finds that he has some rough soldiering to do. All his work is performed with a rifle slung to his back or a revolver in his waist belt, ready to drop and take shelter and open fire upon any enemy in the brush. Linemen are particularly distasteful to the rebels of the islands, and they take every opportunity they can to harass the little bands of workers who are stringing wires across the newly garrisoned country. Ordinarily a guard of from six to eight men accompany the linemen, in which case there is not so much danger of molestation.

There are periods of the year in the group during which the heavy gales sweep the islands from shore to shore, carrying everything before them. I have witnessed the disastrous effects of several of these gales. Shortly after the gale begins, the operators, linemen and all prepare to make repairs. As soon as the gale shows signs of abating, the operators and the linemen secure the services of dozens of natives and then the work of replacing broken poles and repairing insulators and wires begins, so that in a day or two the lines are once again in operation. Often the enemy takes advantage of the gales to do further damage to the lines. If natives are caught near the lines by soldiers or linemen the orders are to shoot any who are acting suspiciously or have tools in their hands for cutting wires. But when the gales rage the native can readily sneak up to the lines and help the gales in their work of destruction by tearing down weakened poles and breaking insulators with rocks, so that the extent of the destruction is sometimes very great and the loss heavy, for the reason that supplies of cross-arms and insulators are not in abundance here, although poles can be cut from the forests readily.

Applicants for appointment to the signal corps

of the army in the Philippines must be physically sound. I have seen many good men rejected from some defect of the eyes or lungs. Even before the applicants are put through the test examinations in the United States concerning their knowledge of line work, telegraph operating, signalling, etc., they are examined physically. This is a severe climate on most men, and few can escape the ravages of one or more of the numerous fevers of the islands. There appear to be fever microbes in the air, for the men never drink any but boiled water, and every precaution is taken to prevent fevers. Yet I have seen many of the men stretched out day after day on the floor or ground of their tents suffering from fever. Often the fever hangs on for many days and will not cease until the man is sent to the hospital for an ice bath. The ice bath drives the fever out of his system and puts him on his feet for a few months, when he is likely to get another touch. Series of such fevers bring on typhoid. But it may be two years or more before anything of the sort occurs, and before the two years have expired the man is usually relieved and sent to a station in the United States. It is believed that definite plans have now been made so that the men will have to serve only 18 months in the Philippines, when they will be relieved and permitted to serve a year in the United States before again returning to the islands.—Electrical World and Engineer.

Congressional Roll-Calls and Voting by Electricity.

A novel plan which is said to be the result of considerable labor on the part of Representative Otey, of Virginia, is to be submitted to the House for its possible adoption. According to the Electrical Review, Mr. Otey wishes to expedite roll-calls in Congress and has invented a machine worked by electricity for that purpose. His idea is to have a board placed directly at the rear of the speaker's desk and in front of the main entrance, such electrical apparatus connected with each member's desk by wiring as would enable him to touch a button and display his vote, aye or no, by means of incandescent lights placed opposite to his name on the board. This would enable the entire house to see exactly what the members were doing, the clerks could figure up the totals in a very short time, and there would be no delay in getting an expression of sentiment on any subject from the Congressmen. At the present time the yea and nay method of voting occupies about three-quarters of an hour, putting the members in a bad humor if they are in a hurry to get the business of the day finished.

SWEDISH TELEGRAPHS.—An official report just issued shows that in 1899 the Swedish telegraph service dealt with 2,644,000 messages, of which a little over one-half were foreign, 3,650 being press telegrams. The correspondence was greatest with Germany, Great Britain coming next, with 7,000 messages less. There were in the country 178 stations under the Government service, 310 railway telegraph stations, and 894 stations belonging to private companies.

Serial Building Loan and Saving Institution.

At the annual meeting of the Serial Building Loan and Savings Institution, of New York, held January 15, at 195 Broadway, the entire old board of management were re-elected as follows: D. B. Mitchell, president; E. F. Cummings, vice-president; Thomas M. Brennan, treasurer; Edwin F. Howell, secretary; J. B. Sabine and A. A. Rich, attorneys. Directors: John Brant, T. F. Laing, E. W. H. Cogley, W. J. Quinn, Max Wustrow, F. W. Gregory, W. C. Burton, T. A. Brooks, M. J. O'Leary, Eugene F. Vacheron, T. E. Fleming, M. W. Rayens, H. G. King, G. H. Schnitgen and William Holmes. Auditors: R. M. Nesbit, James R. Beard and George H. Murphy. Bankers: The Mercantile Trust Company, New York.

The following is the semi-annual statement for the six months, ending January 1, 1901:

ASSETS.	
Cash on hand	\$2,745 89
Loans on mortgage	454,154 40
Loans on shares	24,218 00
Installments unpaid	15,090 00
Interest unpaid	3,788 23
Premium unpaid	884 42
Real estate	58,821 21
Real estate sold on contracts	23,865 63
Due from members	1,977 21
Furniture and fixtures	527 28
	\$586,072 27

LIABILITIES.	
Installments	\$389,628 00
Earnings credited	76,406 07
Matured shares	42,800 00
Full paid shares	12,900 00
Borrowed money	23,173 04
Due on loans	14,282 18
Due individuals	987 96
Earnings undivided	14,639 27
Surplus	11,255 75
	\$586,072 27

The auditing committee, comprising Robert M. Nesbitt, James R. Beard and George H. Murphy, have examined the books and accounts of the secretary and treasurer and certify to their correctness.

WHAT CONSTITUTES "REGULAR" SERVICE.—The people and the press of Prince Edward Island, Canada, demur to the practice of the Anglo-American Telegraph Company closing its offices on that island at 8 o'clock in the evening, and thereby shutting out all outside telegraphic communication and depriving the papers of receiving night press reports. As the telegraph company receives an annual subsidy of \$2,000 from the Dominion Government for maintaining "regular" telegraphic communication between the island and the mainland, the courts will probably be called upon to put its interpretation upon the extent of the obligations involved.

LETTERS FROM OUR AGENTS.

To Our Correspondents.

While we are desirous to receive from our agents letters for publication respecting their various offices and of their personnel, for all efforts of this character are appreciated, we would earnestly request that such communications be confined strictly within the limits of the subject, and not so much space be devoted to hunting and fishing items and other extraneous matter, as is frequently the case. We wish to make the department of "Letters from our Agents" an attractive one, but if we were to publish all that comes to us in the shape of irrelevant matter, of no possible interest to the general reader, it would frequently require us to surrender a number of additional pages to contain it all. The current information of any office will, if carefully chronicled, furnish a welcome digest of news that will be read with pleasure and satisfaction by thousands, and this limit should be the legitimate contents of all letters. And we wish that our correspondents would avoid the too frequent habit, at all times a bad one, of abbreviating words in writing. This is a peculiarity among telegraphers, we know, but what may be plain to the writer, and for local interpretation, is usually a mystery to the editor, and is apt to lead to error in the printed statement.

PHILADELPHIA, PA., WESTERN UNION.

The 13th annual meeting of the Aid Society was held January 14. The meeting was the most successful, both in a business and social way, in the history of the organization. About 100 members were present, and instead of a stormy meeting, which was predicted, everything was peace and harmony. The large amount of business to be transacted precluded the possibility of having the musical entertainment, which in the past became such a successful feature of the meetings. During a recess, however, Miss K. Bullin and Mr. C. M. Christine entertained the members with vocal and piano solos. At the conclusion of the business part of the meeting a supper was served, followed by music and dancing.

The report of the Aid Society for the year ending, December 31, showed a membership of 320, a net gain of 20. The total receipts were \$1,851.11, a gain of \$162.03. The disbursements amounted to \$1,793.21, an increase over the previous year of \$773.61. The cash surplus was \$2,290.92, an increase for the year of \$57.40.

The following officers for 1901 were elected: Frank E. Maize, president; James H. Wilson, vice-president; W. E. Vanarsdall, recording secretary; J. E. Janney, financial secretary; H. W. Hetzel, treasurer. Executive committee: Miss C. J. Grimley, Mr. T. J. Murphy, Miss Ella Hellings. Trustees: W. A. Clark, J. H. Wilson, W. W. Donnelly. Auditing committee: H. Wobensmith, Miss M. A. Golden, C. M. Christine. Entertainment committee: John A. Sisk, R. C. McCredy, J. N. Fitzpatrick, V. G. Hodgins, Charles S. Culp.

Col. Joseph Greene, of this office, recently celebrated his 68th birthday anniversary. Fifty-five years of Mr. Greene's life has been spent in the telegraph business. He is still hale and hearty, a good operator, working steadily, and bids fair to live many more years.

D. C. Shaw, another old timer, well known to many readers of TELEGRAPH AGE as "Owney Gagan," celebrated recently his 55th birthday. Mr. Shaw came from Bath, Me., where he was manager for the Western Union for many years.

Much sympathy is felt for E. J. Hennessey in the loss of his father, who died recently.

Wire Chief E. L. Maize, while on his way to the office recently, slipped on the ice, spraining his wrist very severely.

R. W. Shade has resigned to accept a position with The Associated Press at Harrisburg.

BUFFALO, N. Y., WESTERN UNION.

The Buffalo Electrical Aid Association held its 13th annual meeting on January 14. The official report shows a membership of 366, and cash on deposit \$3,286.59.

At the election of officers the following ticket was chosen: William Walker, president; William Barnfather, vice-president; George W. McCoppen, secretary; R. B. Ferguson, treasurer. Executive committee: E. A. Sawkens, George Salloway, F. E. Krettner, T. E. Hogan, Miss T. G. Toner, Miss Reynolds and Miss R. A. Cheney. Auditing committee: William H. Maibour, Thomas O'Brien and E. F. Cullen.

Miss Emma McDonald is on a six months' leave of absence.

Miss B. C. Donnelly has returned to duty, after an illness of two months.

George Phillips has been appointed operator at the William street office.

C. A. Schudt succeeds F. A. Bump at the same office, the latter having accepted a position in Richmond, Kan.

Miss A. Fitzmaurice is seriously ill.

Mr. Frank R. Knoll has resigned, and now fills the position of repeater chief at Triangle office of the American Telephone & Telegraph Co.

Miss L. L. Walther was appointed manager of the Depew, N. Y., office.

Harry F. Johnson is now manager of the Main street office, vice Joseph McGowan, appointed collector for this company.

Miss Lillian Demming, formerly of this office, but now with the Buckingham printing system, has gone to her home on a vacation.

Resigned: Robert E. Magner, F. R. Moll, V. C. Poe.

Mr. John McNerny, of Dunkirk, N. Y., paid us a visit recently.

CINCINNATI, O., NOTES.

Business has kept up well during the entire winter, the substitutes being able to make more than full time, and the regular men being frequently called upon for extra duty. This is something unusual for this season of the year.

Mr. W. T. McWhorter and Miss Emma Langenheim, both members of the Western Union force,

were married on December 26th. They were handsomely remembered in a substantial manner by their many friends.

W. F. Hart, chief operator at the "Enquirer" office, is seriously ill with typhoid fever, while A. J. Herrman, of the same office, has just returned to duty after a two weeks' siege of the same disease.

Among those on the waiting list here are H. T. Kilgore, formerly of New York, and Charles Kline.

J. E. Neville, of the Postal, is quite sick with grip, which is almost epidemic here.

The eleventh annual session of the Morse Mutual Benefit Association was held at the Palace Hotel Saturday evening, January 12. Preceding the meeting an elegant banquet was served, at which there were seated over 60 members, among whom were many ladies. While the reports of the association show a disbursement of over \$865 in sick benefits during the past year, thus far exceeding any previous year in its history, the financial condition is first-class in every respect, there being a surplus fund in the treasury of \$1,526.50.

The annual election of officers was quite spirited, and resulted in the return of the present incumbents as follows: Geo. Derfus, president; J. E. Neville, vice-president; J. F. Colligan, secretary, re-elected unanimously for his eleventh consecutive term, and F. Minning, treasurer. The Executive Committee is made up of W. S. Slover, W. H. Keer, W. A. Keyt, R. J. Williams, H. Beckmeyer, R. H. Buchanan, W. F. Othling. Auditing Committee, J. R. Rey, W. E. Dunham and W. D. McGarry.

Mr. Philip Joseph, who for a number of years has been manager of the Western Union Telegraph offices in the banking district of this city, was married January 12 to Miss May Zinglein, a popular society lady of Westwood. The happy couple left shortly after for a honeymoon in Florida.

John N. Jacob, who has been suffering with grip for some weeks, has returned to duty.

John F. Colligan is confined to his home with the same complaint, but is slowly recovering.

A brisk fire in the building adjoining this office on January 20 filled the office with clouds of smoke, and caused the night watch signal department of the district to be flooded with water, rendering it useless for several hours. No damage was done to the telegraph departments.

Albert S. Ayers, late of the Scripps-McRae Press Association, Washington, D. C., is now located here with a broker.

CHICAGO, ILL., WESTERN UNION.

Mrs. Hammond is alone and forsaken in the gallery, Mr. Basset having moved his headquarters to the ninth floor, at east end of the loop switch.

Miss Dot McCracken has left the Long Distance Telephone and is with us again, her return being heartily welcomed by all.

Division Chief James Cummins, is ill at his home with rheumatism. During his absence Mr. Charles Fuhrman is acting as chief.

The mention of Charles Fuhrman's name recalls to mind some fast work on the St. Paul wire performed by him, and which was referred to in this paper some time ago, he having broken all previ-

ous records for fast sending and receiving the greatest number of messages in one day.

Mr. Jerry Merenus is hobbling about on a pair of crutches, nursing a sprained ankle.

Mr. Harry Jones has been sick for a few days.

Mr. John Martin is also reported ill.

Mr. Leo Peters was a visitor here a few days ago.

Mr. Arthur Galey carried off the first prize, a beer stein, on the evening of the election of officers of the Morse Council.

John S. McCurdy, wire chief at our Board of Trade office, was publicly installed as Worshipful Master of Ashlar Lodge, No. 308, A. F. and A. M., on January 8. Dancing and cards followed the installation ceremonies, and continued until a late hour. Quite a number of prominent telegraphers were present to enjoy the occasion. This Lodge has on its roll the names of between 20 and 30 telegraphers.

The officers-elect of Morse Council National Union for 1901, were duly installed on Saturday evening, January 19, by Senate Deputy D. W. Manchester, assisted by Charles Werne, as Marshal. They are as follows: William Leary, president; L. E. Westrope, vice-president; F. M. Crittenton, ex-president; W. H. Izzard, speaker; F. J. Scherrer, secretary; Henry Behl, financial secretary; J. S. McCurdy, treasurer; S. A. Schulkins, chaplain; O. B. Sims, usher; C. F. Fuhrman, sergeant; G. H. W. C. O'Brien, door keeper; Henry Jahn and H. C. Mahoney, trustees; H. D. Baker and J. J. Seidschek, cabinet delegates.

The Council shows an increase in membership of 29 for the past year, making a total membership of 177, and has the distinction of being in better financial condition than any other Council in the order in proportion to its membership.

KANSAS CITY, MO., WESTERN UNION.

Miss Florence A. Thompson has gone to San Antonio, Texas, on an indefinite leave of absence, hoping to be benefitted by the change in climate and to overcome a throat trouble which has been a source of annoyance to her.

Deafness Cannot be Cured

by local applications, as they cannot reach the diseased portion of the ear. There is only one way to cure deafness, and that is by constitutional remedies. Deafness is caused by an inflamed condition of the mucous lining of the Eustachian Tube. When this tube is inflamed you have a rumbling sound or imperfect hearing, and when it is entirely closed deafness is the result, and unless the inflammation can be taken out and this tube restored to its normal condition, hearing will be destroyed forever; nine cases out of ten are caused by catarrh, which is nothing but an inflamed condition of the mucous surfaces.

We will give One Hundred Dollars for any case of Deafness (caused by catarrh) that cannot be cured by Hall's Catarrh Cure. Send for circulars, free.

F. J. CHENEY & CO., Toledo, O.

Sold by Druggists, 75c.

Hall's Family Pills are the best.

The many friends of Mr. Samuel McConnel will regret to learn of his loss of his little 5-year-old daughter, who died of scarlet fever, January 16. The remains were taken to Mexico, Mo., for interment.

Mr. William Norman and Mrs. Ida Phillips were Leavenworth, Kan., visitors January 19.

A child was born to Mr. and Mrs. William Walker on December 31.

HAVANA, CUBA, NOTES.

Among the recent arrivals in Havana were Operators Cantwell and Olsen, who will work at this point.

A rumor has gained currency that our night chief will shortly take unto himself a better half.

Sergeant John C. Wheaton, who has earned a fine record here, has been transferred to Principe as relief to our mainstay, James Armstrong, in keeping the repeaters working. Sergeant Edward Ford, of Bayamo, goes to Santiago, relieving Operator Boyd, who has resigned, to accept a better position. S. E. Clinard, of Manzanillo, will succeed Sergeant Ford at Bayamo as operator.

Mr. Turner, a very intelligent sergeant of the Signal Corps, has been assigned to the chiefship of the Santiago Province, his excellent handling of the affairs in his old district fully warranting the action of his superior in placing him in his new position.

By his steadiness and the exercise of first-class judgment, the veteran Ingram, who works the Santiago end of the Havana wire, has gained the deserved appellation of being one of the A1 men in Cuba.

Mr. Solomon J. Bloodworth, our new manager, is conducting the affairs of the Havana office in a manner that stamps him as being a man of thorough experience.

DENVER, COL., NOTES.

W. A. Dunaway, of the Colorado and Southern Railway, has returned from his holiday vacation.

J. H. Ryan, who spent the holidays in Kansas City, is also back at work.

T. B. McCaffrey, of the Colorado Southern Railway, who had been very ill with an attack of grip, died January 18.

The marriage of Hubert A. Dodge, a former Western Union operator, and Miss Evaline Williams occurred on January 15. The couple went East for an extended trip, and will visit Mr. Dodge's former home in Detroit, Mich. The bride is a daughter of Mr. John Williams, one of the first settlers of Denver, and is a social favorite.

ST. LOUIS, MO., WESTERN UNION.

The Western Union telegraphers are contemplating giving a ball in the near future, probably the 15th of February. A committee of arrangement, consisting of H. V. Crain, president; M. M. O'Neill, secretary; William H. Dinwiddie, chairman, and Henry Van Dam, treasurer, has been appointed. A good time is assured.

The friends of George J. McGann have petitioned Gov. A. M. Dockery to appoint him as one of the St. Louis police commissioners.

Mr. Deverell and wife passed a part of the holidays at his home at Whitby, Can.

A. Kern and family spent two very pleasant weeks during the holiday season with his parents at Monroe, La.

Ray McConnell, of the Cella Com. Co., who experienced quite a siege of pneumonia, is now convalescing.

Miss Anna Murphy left for Monticello, Ark., January 9.

Hermann Weyerman went to Jefferson City to help out during the session of the Legislature.

W. J. Lloyd, of Chicago, was a recent visitor.

KANSAS CITY, MO., POSTAL.

Mr. G. C. Sperry, formerly manager at El Paso, has been appointed a repeater chief at Kansas City for the Logan leased Chicago-San Francisco wire. Mr. G. S. Palmer performs the same duties for the New York-San Francisco and Chicago-San Francisco duplexes.

Mr. Wood has returned to Sante Fe, N. M. and Miss Campbell to Cerrillos.

SAN FRANCISCO, CAL., WESTERN UNION

Mrs. Rose G. Brown, of San Francisco, has been appointed manager at Carson City, Neb.

Miss Etta Simmons, of Marysville, has been appointed manager at Santa Cruz, Cal., vice Miss Laura Coates, retired from the business.

Miss Jennie W. Bacon, of San Francisco, is relieving Miss Cluett at Visalia.

Will Williamson, of East Oakland, has gone to Hotel Arlington, Santa Barbara, as operator for the season.

Arrivals: N. M. Hanson, D. C. De Lany, O. R. Dogge, J. A. Rissell and C. H. Shively, from Chicago.

The heavy increase in business has necessitated the addition of two Morse duplexes to Chicago, thus making three to Chicago, one to New York, and one Wheatstone to Chicago. The operating room is also being enlarged to make room for additional wires.

PHILADELPHIA, PA., POSTAL.

Of the officers of the Electrical Aid Society lately elected, the Postal Company furnished its quota. Mr. James H. Wilson, the vice-president, is manager of an important branch office; Mr. H. W. Hetzel, the treasurer, is assistant to Cashier Geo. G. Glenn; Mr. Thomas J. Murphy, a new member of the executive committee, is an extra man on the night force.

The Messrs. Albert Weiss, J. McGarvey and Fred Skerrett have been transferred to regular night duty.

Miss M. V. Hagan, of the City Department, Mr. M. Auerbach, of the North Front street office, and Miss Greiner, of the Vine street office, were each compelled to remain at home a short time on account of the ravages of the common enemy—grip.

Chief Operator C. A. Stimpson, accompanied by Mr. Joseph Eder, took a trip to Reading, Pa., and virtually modernized the old switchboard at that place, re-arranging the wiring and adding spring-jacks and loop cords. One of the primary causes

for this work was to accommodate the additional wires running up into the coal regions.

Miss Bessie Knight is again at work in a broker's office.

Miss Jennie Melville spent a day in charge of the Test office at Conshohocken.

A storm door recently erected at the employees' entrance is one of the greatest comfort-assuring conveniences we enjoy.

POTTSVILLE, PA., WESTERN UNION.

Miss Mary Tucker spent a few days lately with friends at Reading and Philadelphia.

Mr. E. H. Miller, chief operator at this place, has the sympathies of a large number of friends in the loss of his wife, who died very suddenly on January 13, expiring within fifteen minutes after being stricken.

Joseph Witman and Mr. Beyerle, of this office, and members of the famous Third Brigade Band, N. G. P., accompanied that organization to Harrisburg, where they gave a successful concert on January 24.

Mr. M. C. Croll, manager of the Pennsylvania and Reading telegraph at Williamsport, who worked at this place over a quarter of a century ago, was a recent caller on some of his old-time friends here.

Eugene Miller, train dispatcher at Tamaqua, spent a few pleasant hours with us recently.

LIMA, O., NOTES.

The Buckeye force at this point remains about the same with the exception of the transfer of Edward Sullivan from Findlay, O., to Lima, and G. D. Beaumont from Lima to Mermill, O.

The big oil well struck in Texas lately made things pretty lively here for a time. The market took a tumble and there was a scramble to sell, consequently the different departments were worked to their utmost capacity.

We have escaped the grip so far, the only exceptions being John McNeff and W. H. Crimmel, and they were only absent a couple of days.

Edward Ogelvie is still manager at the Western Union, assisted by Operators E. Hill, G. S. Rohn and E. C. Rohn.

I. W. Brown is manager of the Postal, assisted by Bert Neff.

NEW YORK, POSTAL.

The painting and decorating of the main office has been completed and the office now presents a fine and cheerful appearance which the force duly appreciates.

Business for January held up remarkably well in comparison with a year ago, and the "extras" have been doing fairly well for what is known as the dull season.

Mr. H. C. Bunting, formerly of the Postal, when located at 187 Broadway, and lately of The Associated Press, has been appointed night traffic chief of the Eastern and Northern divisions in place of T. G. Williams, resigned.

Mr. E. W. Clowes, who recently arrived from Elkhart, Ind., has been assigned to duty in the Western and Southern divisions.

Mr. J. A. Ross, who has been South for the last

two months, has resumed his duties on the West and South.

The Eric Telephone Company having removed their general offices from the city, Mr. Orvan H. Davidson has returned to duty in this office.

Mr. F. C. Yule is back again from a four weeks' vacation spent in the West.

Mr. Harold Rhodes, of the Western Division, is once more at his post after an absence of two weeks, caused by a severe attack of grip.

Mr. Geo. F. Randolph, of the leased wire board, is laid up with a severe attack of rheumatism.

Mr. G. O. Heath, recently of the Postal staff at Columbus, O., has been assigned to the Cleveland duplex.

Mr. E. A. Goshert, lately of the Washington, D. C., force, has been assigned to the New York-Buffalo bonus wire.

Messrs. Thos. F. Kehoe and Jas. F. Ahearn, respectively of the Postal "World" and "Journal" staffs, and Mr. W. Stirling, of the main office, handled the specials for the newspapers at Paterson, N. J., during the recent sensational murder trial at that place. They averaged 40,000 words daily for the afternoon papers alone, handling it in fine shape and to the entire satisfaction of the papers and their employers. Manager B. J. McCabe and his assistant, Mr. Lewis, of the Paterson Postal office, deserve great praise for their share of the work and management of the affair. Two hundred and fifty thousand words were handled during the trial.

The Postal branch offices at 147 West Forty-second street and 1586 Broadway, are under the management of Mr. Eugene Tully, who has been a branch office manager for the Postal for the last ten years and who is highly esteemed by the officers of the company. The force at 147 West Forty-second street is as follows: F. Geigle, day operator; H. Lewers, night operator; E. Kauper, all-night operator. Clerks: J. Geigle, C. Cuerdo and F. Archer. At 1586 Broadway H. Reinhardt is the day operator; E. Collins, night operator; W. Shady, clerk. Manager Tully is fortunate in having such an efficient staff under him.

NEW YORK, WESTERN UNION.

A handsomely illustrated card bearing New Year's greetings to all the employees at "195" was received recently from the operators at Pahnna, Prague, Bohemia.

Mr. E. Payson Porter, who on account of the bad condition of his eyes, has been confined to a dark room for some weeks, resumed duty January 12.

Miss Belle M. Davis, of the city line department, is at her home seriously ill. Miss "Jo" Mulaney, formerly of "195," is also confined to her home on account of sickness.

Mr. Edward S. Rowan, clerk to General Traffic Chief Nourse, resigned January 11 to accept a position as stenographer with a local private company.

Edgar Dennis, late a boy in the Race Department, was promoted January 21 to be an operator and assigned to the Produce Exchange.

Joseph O'Donnell, for the past two years clerk

and assistant receiver at the Cotton Exchange branch, died at his home in Brooklyn, on January 15. On the day of his funeral his office associates sent a handsome floral cross.

Miss Florence M. Card, of the Erie division, who resigned on account of ill-health, writes from Sing Sing, N. Y., that she is slowly improving.

Mr. J. M. Casey, of this office, left for Denver, Colo., January 23 for the benefit of his health.

Mr. Harry B. Rathbone has recovered from his late illness. He was recently appointed on the night editorial staff of the New York Journal.

Mr. Charles T. Thompson, wire chief of the American Telegraph and Telephone Company, Boston, Mass., was a recent visitor at "195." Mr. Thompson is in New York to look over switchboards for the use of his company in Boston and elsewhere.

Mr. Thomas M. Brennan, assistant manager, who has been ill with grip, returned to duty January 25.

Mr. J. F. Paddock is receiving congratulations on the birth of a son.

Mr. Vincent J. Burns has a daughter, born January 19.

Miss Ella Wilson and Miss Lizzie Gilkey attended a performance recently to see "In the Palace of the King," and were very much pleased at Miss Viola Allen's interpretation of it.

Mr. T. A. Brooks, who has been time-keeper at "195" for the last twenty years, and Mr. W. J. Quinn, the secretary of the aid society, and payroll clerk for fifteen years, have probably a more extended acquaintance among telegraphers than any other men in the business and could relate many reminiscences.

If the inventor of the typewriter sending machine were to visit "195" he would notice many of the men sending with their thumbs and hands badly cramped. Through pity he would endeavor to hasten the completion of a machine which will be a godsend to the telegrapher—sender as well as receiver.

Mr. John King has the sympathy of his friends in the death of his young son, which occurred January 11.

Mr. Wm. H. Gunning, formerly of this office, is now at Palm Beach, Fla., where he holds the position of chief mail clerk for the Hotel Royal Poinciana.

Mr. John Fannon, formerly employed by Armour & Co., at their Duane street office, has gone to Los Angeles, Cal., for the benefit of his health.

Mr. Frank Fanning, formerly of "195," and latterly of 985 Eighth avenue, office, died January 5, of Bright's disease.

134 PEARL STREET BRANCH.—This is one of the oldest branch offices in Superintendent Redding's district, and presents a very busy appearance. The

bulk of the immense volume of the sugar and coffee business is handled at this point. Mr. J. P. Kirchner is the manager, having served as such for the past fifteen years. He is a man of ability, and by long experience is well qualified to meet all emergencies. His staff is made up as follows: Messrs. J. J. Gaitlan, James Crowley and H. Weir, operators; John Wiegel, bookkeeper; Robert Knapp and J. J. Sunly, receivers, and Roland Elmendorf, clerk. The American District Telegraph Company is also located here. T. S. Mahoney is manager, assisted by Messrs. James McNulty and Philip McVey and a force of thirty boys.

Typewriters expressed or sent to our shop, repaired or rebuilt at lowest prices for operators. Cylinders, ribbons, at reduced prices; machines bought, sold and rented. Wall & Butler, 57 Dey street, New York. (Adv.)

Any fifty-cent piece of music mailed eighteen cents. Rusticana, Anchored, Calvary, Palms, Flower Song, ten cents each. Anything at less than half publisher's price. I will sell you a good piano for one dollar per week, from \$35 up. B. L. Brannan, 195 Broadway, New York. (Adv.)

Dr. Slaby, who has recently been making experiments under the patronage, and with the suggestions, of the German Emperor, has reached the conclusion that what we now call "wireless" telegraphy would better be named "spark" telegraphy. He seems to be right, inasmuch as no wireless system of telegraphy has yet been invented—that is, a wire of some kind or other is used in all the systems that have been described to date. At the same time, despite their differences in other regards, all of such systems use the electric spark to set up electrical oscillations, so that the term seems one that excellently fits its subject.—Electrical Review.

Mr. G. W. Ellis, formerly with the Anglo-American Cable Company, 8 Broad street, has recently been appointed to fill a vacancy in the telegraph department of the Standard Oil Company, 26 Broadway, New York, which was created by the departure of Mr. W. C. Stewart to accept a position with a manufacturing firm at Sharon, Pa. The telegraphic personnel of this office is as follows: H. W. P. Swisher, manager; H. C. Wildner and Sidney H. Flagler, assistant managers; W. J. Cogan, G. W. Ellis and Charles V. Drake, operators.

Thirty-eight new boxes were added to the Chicago fire-alarm telegraph system during 1900.

Readers of the TELEGRAPH AGE are referred to the advertisement of the Montauk Cable Company on page two of the front cover. (Adv.)

The Modern Service of Commercial and Railway Telegraphy (8th Edition, revised and enlarged), by J. P. Abernethy. The theory and practice, including railway station and express service. Arranged in questions and answers. 425 pages, 40 illustrations. Price \$2.00, expressage prepaid. Address John B. Taltavall, The Telegraph Age, 263 Broadway New York.

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J. S. TOWNSEND—The Telegraphers' Jeweler, 1554 Wabash Ave., Chicago, offers any article in his elegant stock at net wholesale prices. A rare opportunity. Any watches or jewelry advertised can be bought at a lower price from this well known firm, J. S. TOWNSEND, 1554 Wabash Ave., Chicago. Our 400-page catalogue sent on application. Agents wanted. Established 1877.

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SEAL OF NORTH CAROLINA PLUG CUT

is a mild, cool, mellow and satisfying tobacco of the highest quality and is the most popular and largest selling brand of "plug cut" smoking tobacco in the world! The reason for this is that the leaf that "Seal" is made of is cured in its own native climate—in the sunshine and balmy atmosphere of the southern states, where pipe tobacco originated. A full size trial pouch will be sent by return mail on receipt of ten cents in postage stamps by
The American Tobacco Co.,
111 Fifth Avenue, New York, N. Y.



I have used Piso's Cure for Consumption for colds, and found it a splendid medicine, as it gives instant and (when taken according to directions) lasting relief, and I would recommend it to all who are so troubled.—R. J. COYNE, Directory Department of Chicago Post Office, Chicago, Illinois, April 7th, 1899.

Maver's American Telegraphy. A thorough Encyclopedia of the Telegraph. Over 600 pages, 450 illustrations. Price, \$3.50, express charges prepaid. Address J. B. Taltavall, 253 Broadway, New York.

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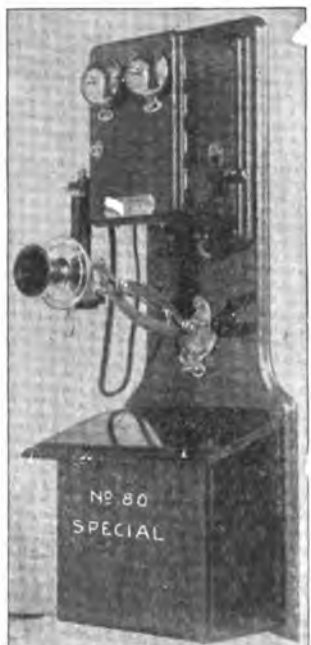
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With red, white, blue, green, moss, crystal, blood-stone, tricolorite and other fine points; mounted on ebony, mahogany, pearl, bone, gutta-percha, rubber, cedar and pen handles; with nickel-plated, gold-plated and engraved ferrules, some with sliding, others with reversible, points. Price, 20 cents to \$5.00 each. On exhibition, 10,000 agate points, agate pens, rulers, paper weights, paper cutters, all-agate stylus, agate point watch charms, etc. Many of them making handsome presents, souvenirs, etc. Send for price list, with full-size cuts.

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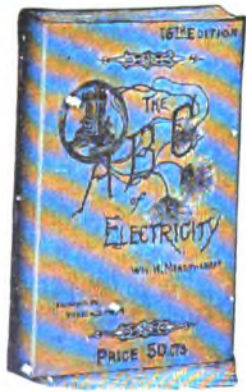
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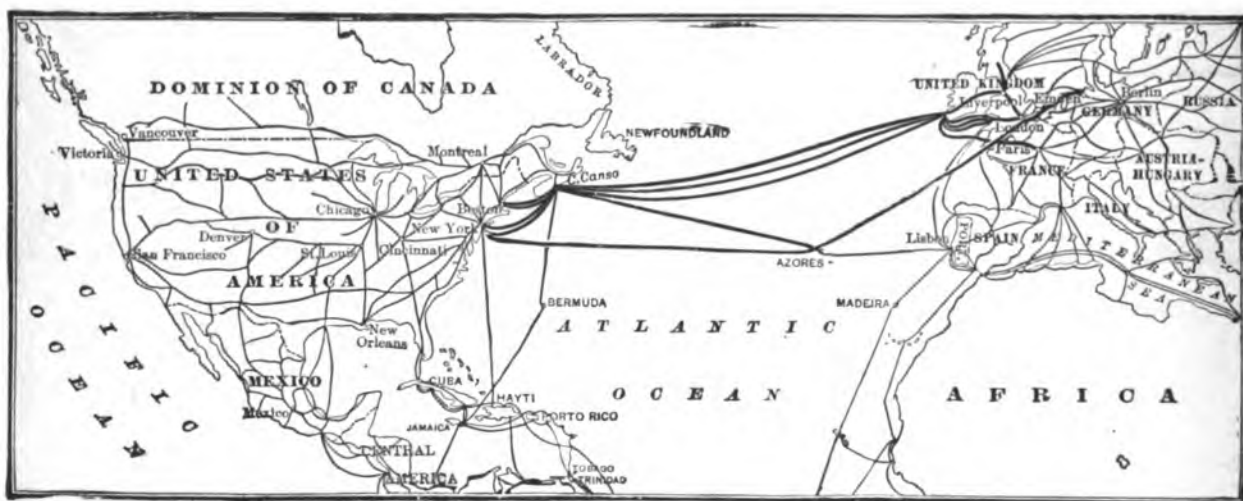


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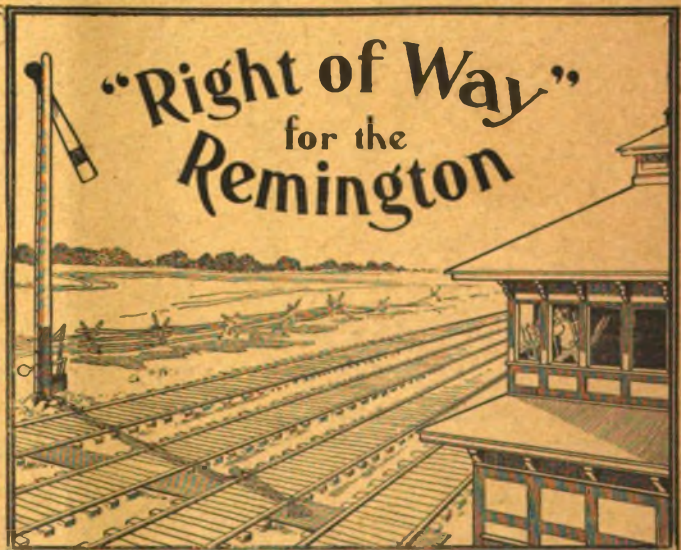
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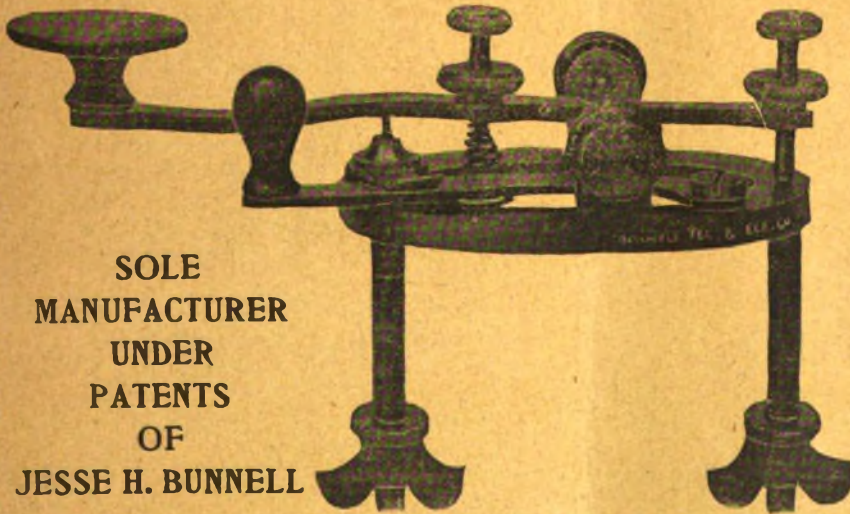


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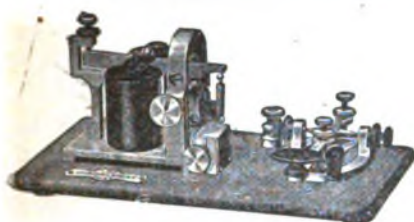
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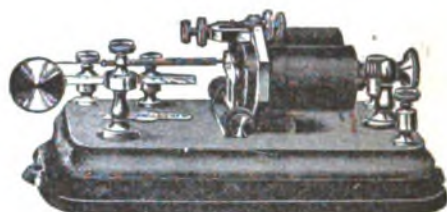
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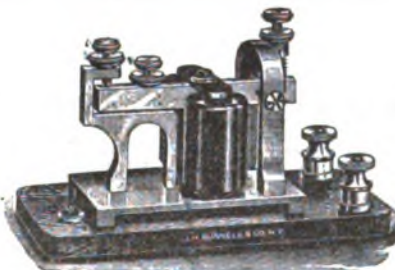
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THE TELEGRAPH AGE.

No. 4.

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VOL. XXIV.

CONTENTS.

Some Points on Electricity.....	67
Business Notices. Miscellaneous Items.....	68
Obituary. Personal Mention. Resignations and Appointments.....	69
Recent New York Visitors. Recent Telegraph Patents.....	70
Reminiscence of the Prince of Wales' Visit. M. D. Shaw Fund. New Wireless Telegraphy.....	71
The Telephone in the Nineteenth Century.....	73
The Employment of Women in the Telegraph Service in Foreign Countries.....	74
Publications. T. M. B. Association.....	75
Editorial. Government Telegraph in Canada. A Mental Anguish Bill.....	76
Cable Manufacture in the United States.....	77
A Cholly-Lulu.....	78
The Boston Ball.....	79
Mr. Dooley Reviews the Century. Sir Wm. Preece Refers to His Boyhood Days.....	80
The Signal Service Corps in China. Government Control of the Telegraph. The Centre of Population in the United States..	81
Strange Railroad Coincidence. Laying the First Ocean Cable..	82
Straightening Out Wires. To Our Correspondents. Southern Pacific Telegraph System. The San Joaquin Division.....	83
San Francisco, Western Union; Charleston, Western Union; Evansville, Postal.....	84
Chicago, Western Union; Kansas City, Associated Press; Cincinnati, Postal.....	85
Atlanta, Western Union; Philadelphia, Postal; New York, Postal Newport, Western Union; Toronto, Canadian Pacific; Montreal, Canadian Pacific; Philadelphia, Western Union; Kansas City, Western Union.....	86
New York, Western Union. Telegraph Linemen's Error.....	87
	88

SOME POINTS ON ELECTRICITY.

BY WILLIS H. JONES.

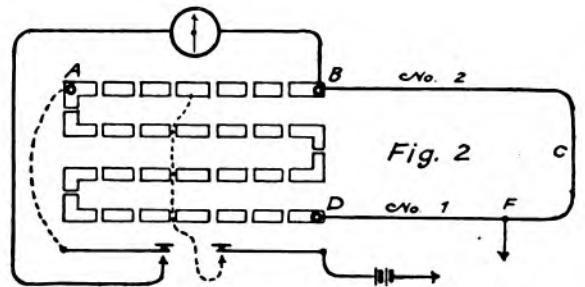
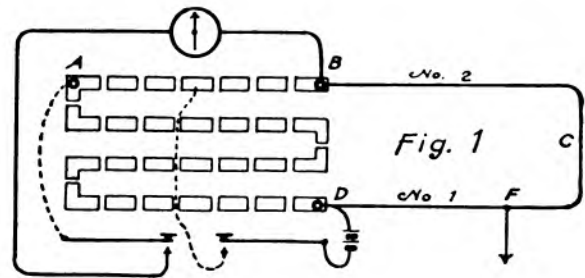
The Galvanometer—Continued.

In a preceding chapter of this series of articles it was stated that the process of handling the galvanometer outfit is very much like that followed when balancing a differential or polar duplex. That is to say, the aim of the operator is to make the ohmic value of the circuit B—G equal to A—L, arms X—A and X—B being already of equal value in each device; and that the balance or measurement in either case is completed only when the current ceases to exert a magnetic influence on the armature of the relay or the needle of the galvanometer, respectively.

From this it will be seen that in order to ascertain the ohmic resistance of a wire or other conductor, it is simply necessary to attach the same (which, of course, must be grounded at the distance end) to arm A of the wheatstone bridge, center the needle, placing it so that it points to zero, and proceed to take a balance in the usual manner by altering the resistance in the wheatstone rheostat until the needle is not affected by the current when key K is temporarily depressed. When this has been accomplished, count the unplugged resistance in the box, and the figure, or figures, obtained will represent the ohmic resistance of the wire or conductor measured. Could anything be more simple? The main thing, after all, is to thoroughly understand the nature of each problem and the conditions existing in each circuit about to be measured.

If, for example, it was desired to ascertain the insulation of a long telegraph circuit, the reader would gain very little information from the mere

statement that the connections and process is identical with that described in the conductivity example just mentioned. He must first understand that while he is about to find the value of an unknown resistance, it is not alone the resistance of the wire itself that he must contend with, but that, also, of the unavoidable side paths, or escapes, via the poles along the line. Hence he must open the wire at the distant end in order that the current may find no outlet to the ground except via the illegitimate or insulation defects at the poles. Then, again, he should know beforehand that insulation resistance, especially on good wires, is very great, the figures sometimes running into millions of ohms. As the rheostat does not contain anything near that many



ohms of resistance, it is necessary to make a change in the value of the arms X—A and X—B in the bridge.

For a measurement of this kind the plan would be to give arm X—A a much greater value than that in arm X—B. Thus, if the value of X—A be, say, 10,000, and that of X—B 100, after a balance in the usual way has been taken, the true resistance is obtained by multiplying the value of the unplugged resistance in the rheostat by 100, because, with the bridge arranged in that proportion, 100 times as much current traverses X—B and the rheostat as passes through X—A and the open wire. Finally, as the result shown represents the joint resistance of the entire external circuit, the insulation per mile, or per pole, as may be desired, is ascertained by dividing the total value of the insula-

tion resistance thus obtained by the number of poles or miles, respectively, in the circuit measured.

On the other hand, when the resistance of a short piece of wire to be measured is exceedingly low, the value of the arms in the bridge must be reversed—that is to say, place the greater proportion of the resistance in the arm X—B instead of X—A, in order to shunt the most of the current the other way, and thus protect the needle from too great a magnetic influence. In this case the true value of the conductor measured will be but one hundredth of the unplugged resistance found in the rheostat.

Let us now measure a defective wire, just to show the manner in which we would go about it. Assume that wire No. 1 was grounded at a certain point, the distance to which is unknown. If the ground was solid—that is, possessed no resistance in itself—of course the wire should be connected at B and balanced by the rheostat in the usual way, but when the ground is insecure, the measurement should be made by what is called the Varley loop test. This requires a second wire, which should be one approximately identical in size and length with the defective conductor, and perfectly clear. In large offices there are usually a number of such wires strung on the same poles.

Loop the two conductors together at the first station beyond the fault, and connect them, respectively, to the wheatstone bridge, as shown in Fig. 1, the good wire to arm B, and the other to the end of resistance coils R at D. One pole of an intermediate battery should also be connected to binding post D, which takes both grounds at F.

When a balance has been taken, the resistance R will show the total resistance of the two combined wires. Assume that it was found to be fifty ohms. Make a note of the amount and then proceed as follows: Remove the battery from D, and ground one end of it, as shown in Fig. 2, but do not disturb the other connections. Now balance as before. The result will show how much resistance it was necessary to add to wire No. 1 between D and F in order to balance the good conductor, No. 2, with the remainder of No. 1, between C and F, added to it.

Assume that the box contains ten ohms. This means that half of that amount has been added to the good wire, and the same amount subtracted from the wire we are measuring. Therefore, to find the true resistance of wire No. 1 between D and F, subtract ten from fifty (the total resistance of the loop as first measured), and divide the remainder by two, thus:

$$F = \frac{50 - 10}{2} = 20 \text{ ohms.}$$

The formula for the Varley loop test is:

$$\text{Fault} = \frac{\text{Res. Loop} - \text{Res. in rheostat}}{2}$$

To find the distance to the fault divide the result by the known resistance per mile, or foot, of the conductor measured.

(To be continued.)

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Business Notices.

The Electric Storage Battery Company, of Philadelphia, manufacturers of the "Chloride Accumulator," announce that owing to the very large increase in their business in the middle Western states, they have established a branch office at St. Louis, Mo. This office has been placed in charge of Mr. R. H. Klauder, formerly of the Philadelphia staff, and will be located in the Wainwright building. Mr. Klauder's extensive experience, gained during his connection with the Electric Storage Battery Co., has made him thoroughly familiar with up to date storage battery practice.

The Standard Underground Cable Co., of Pittsburgh, Pa., announce that they have recently completed and put in operation their new Eastern factories at Perth Amboy, N. J. Located at tide-water, the facilities of this company for ocean deliveries will be of course measurably increased. In this connection there have been some departmental changes. Mr. George L. Wiley will continue as manager of the Eastern sales department at 56 Liberty street, New York, while Mr. Charles T. Marsh, with offices at the same address, has become manager of a new department known as the Eastern and Northeastern sales department. About March 1st still another department will be established at Boston, Mass., of which Mr. Atlee B. Saurman, formerly assistant manager of the Eastern sales department, will have charge.

Miscellaneous Items.

Mr. W. S. Cunningham, manager of the Postal office at Greenwood, Miss., writes: "TELEGRAPH AGE continues to improve, and I do not see how any man that is interested in his profession can get along without it."

Mr. Clyde H. Newman, manager of the Postal office at Rochester, N. Y., has been made manager of the office at Buffalo, N. Y., the vacancy at Rochester being filled by Mr. R. J. Little, transferred from the management of the Scranton (Pa.) office.

Mr. J. B. Stewart, the former superintendent of telegraphs and signals of the West Shore railroad, at Weehawken, N. J., is doing effective service in introducing the block signal system along the line of the old Fall Brook and Beech Creek railroads, now known as the Pennsylvania Division of the New York Central.

Mr. C. H. Wilson, a well-known former telegrapher, and until lately general manager of the Southern Bell Telephone and Telegraph Company, at New York, resigned that position to accept the appointment of general superintendent of the American Telephone and Telegraph Company, with headquarters in New York city. Mr. W. T. Gentry, who has been superintendent of the Southern Company at Atlanta, succeeds Mr. Wilson as general manager, continuing to make the latter place his headquarters.

Obituary.

Guy Franklin Clark, a well-known Associated Press operator, died at his home in South Charleston, Ohio, on January 20, aged 27 years.

Zénobe Théophile Gramme, the well-known inventor and electrician, a Belgian by birth, died at Bois Colombes, near Paris, France, on January 20, in the 75th year of his age.

Luther C. Dodge, who, when a young man, was a telegraph operator at Burlington, Vt., on the old line between Troy and Montreal, died at his home in San Francisco, Cal., where latterly he was engaged in the lumber and mining business, February 4, aged 79 years. He was thrice elected mayor of Burlington.

Albert W. Guilbert, a telegrapher, died at Racine, Wis., January 23, in the 55th year of his age. When the Western Union Telegraph was first opened between Racine and Rock Island, Mr. Guilbert had charge of all the telegraph stations along the line of that route, afterwards becoming superintendent of the division.

John H. Farrell, editor and proprietor of the Albany (N. Y.) Times-Union, died in that city on February 2, in the 62d year of his age. He had had a long and varied newspaper career. He was senate reporter for The Associated Press for twenty years, was one of the founders of the United Press, and for many years its vice-president. In 1895 he was elected president of the New York State Press Association.

Jesse M. Sarvis, one of the oldest newspaper correspondents in Washington, D. C., died in that city February 8. He was born in Juniata County, Pa., about sixty years ago. He was one of the first telegraph operators in the employ of the Pennsylvania Railroad Company, and when a youth, it is said, he and Andrew Carnegie worked together in the same office in Altoona. From about 1865 to 1870 Mr. Sarvis was employed by the Western Union Telegraph Company in Washington, but since then has been connected with various New York financial journals.

Mrs. Stella Jewell Tinker, the wife of Charles A. Tinker, general superintendent of the Western Union Telegraph Company, New York, died at her home in Brooklyn, on January 30. She was a woman highly esteemed, of a lovely Christian character, given to quiet and unostentatious charities, and will be sincerely mourned by a wide circle of friends. The funeral services, which were largely attended, and notably so by representative telegraphic officials, were held on February 2, and were conducted by the Rev. Dr. L. Mason Clark, of whose church, the First Presbyterian, she was a member, assisted by the Rev. Dr. Robert MacDonald, of the Washington Avenue Baptist Church.

Ira De Witt, of Pittsburg, Pa., a former New York Western Union operator, died in Parkersburg, Pa., on January 28, aged 57 years. He was born at Barryville, N. Y., in 1843, and found employment in New York as a telegrapher when 16

years of age. He served through the Civil War, after which he returned to New York and became connected with the Western Union Telegraph Company. In 1896 he left New York, going to Pittsburg, Pa., where he engaged in the oil business, in which he became well known. He is survived by a wife and three daughters.

John J. Eagan, formerly a United States military operator, died at Dallas, Tex., February 4, aged 58 years. When the Civil War broke out Mr. Eagan enlisted as an operator, first serving under Gen. John C. Fremont. He afterwards took an active part in the service throughout the continuance of the war, his field of operations being principally in the Southwest. He went to Texas in 1866. He leaves a wife and three married daughters.

Personal Mention.

Mr. Thomas A. Edison will shortly leave his home at Orange, N. J., for a month's vacation in Florida.

Mr. F. W. Jones, electrical engineer of the Postal Telegraph-Cable Company, New York, accompanied by Mr. Minor M. Davis, assistant electrical engineer, are in Baltimore, Md., whither they went on official business February 14.

Resignations and Appointments.

Mr. Charles A. Blair, for eighteen years manager of the Postal Telegraph-Cable office at Richmond, Ind., has resigned to accept a position as city ticket agent at that point for the Cincinnati, Richmond and Muncie Railroad Company, a new corporation.

Mr. Smith H. Riker has resigned his position of wire chief with the Western Union at Syracuse, N. Y., where he has been with but slight intermission since 1883, to accept an appointment with the American Telegraph and Telephone Company, at Troy, N. Y.

Recent New York Visitors.

Mr. Alexander Crow, a well-known telegrapher, and now chief claim agent of the Pennsylvania Division of the New York Central and Hudson River Railroad, at Corning, N. Y.

Recent Telegraph Patents.

A ship's telegraph has been patented by Leon S. Thompson, of Washington, D. C.

A printing telegraph instrument has been patented by L. M. Cassella, of London, England.

A column printing telegraphic instrument has been patented by Frederick H. W. Higgins, of London, England.

Mr. W. R. Brixey, the well-known cable manufacturer, of Seymour, Conn., and New York city, has received a Government contract for 600 miles of submarine cable for use in the Philippines.

Reminiscence of the Prince of Wales' Visit.

Mr. Robert Stewart, of Greenville, N. J., former superintendent of the telegraph system of the New Jersey Central Railroad, tells of the time he met the former Prince of Wales, now King Edward VII. It was in South Amboy in 1860. The Prince and his suite had just made the trip from Camden to South Amboy over the Camden and South Amboy Railroad system. Telegraphy was then comparatively in its infancy. The road had just adopted the telegraph signal system, and Mr. Stewart was its first operator. He had control of about 300 men, and had charge of the reception of the Prince at the South Amboy terminal.

The Prince was returning from a visit to the President at Washington. At that time the Amboy route was the only route between New York and Philadelphia. The Prince and his party traveled from Camden to South Amboy in a special train, made up of an engine and three cars. The engine was an old "wood burner," and the fastest on the road. In those days the cars were not so elaborately arranged and furnished as to-day, and a long ride in one of them was not always a joy. Seats were arranged along the side, similar to the arrangements of trolley car seats. The trucks were not then equipped with patent springs, and the railroad passenger was subjected to considerable jarring.

From Camden to South Amboy is 63 miles. This fast train made the trip in exactly three hours, which was then record breaking time. When the Prince and his party alighted at the Amboy station they were met by Mr. Stewart and a number of officials, who escorted them to the steamer *Alida*, which was waiting to convey the party to New York. On board of the *Alida* was a party of New York officials.

Mr. Stewart says that he remembers the incident as though it happened but yesterday. He says:

"The Prince seemed to be extremely modest and of a happy disposition. He was certainly most democratic in his manner. He shook hands with many of the people about him. All along the road the people had come out to greet him, and he expressed himself as being delighted at the manner in which he was received. At that time one of the Bonapartes, a brother of Emperor Napoleon II., was residing at Bordentown, N. J. The Prince referred to the Bonapartes and said that it pleased him to have been in the State that sheltered one of the family. I never saw the Prince after he boarded the *Alida*, but my recollections of him have always been most pleasant. He was then a boy not more than nineteen years old, but he impressed me as being exceedingly intelligent.

"The Camden and Amboy Road then owned the engine *John Bull*, which is now in the Smithsonian Institution. Great improvements have been made in railroads since that time. The Camden Road, although operating but sixty-three miles of track, was then a railroad of considerable importance. It has since been absorbed by the Pennsylvania system. In those days accidents

were numerous. Engines and cars often broke down and caused long delays. About every ten or fifteen miles stops would have to be made for wood and water. Piles of wood for fuel were placed along the entire line. It can readily be imagined that firemen were pretty busy men."

In 1875, when the Grand Duke Alexis, of Russia, visited America, Mr. Stewart was in charge of the special train that conveyed the Duke and his party over the Pennsylvania Railroad from Jersey City to Philadelphia. He says that the Duke was an extremely affable man, and that he tipped all railroad employees liberally. "The Duke," said Mr. Stewart, "appeared to be very fond of wine."

Mr. Stewart is one of the pioneers in telegraphy in this country. He has been connected with various railroads for more than forty years. He was telegraph superintendent of the New Jersey Central Railway for fourteen years. He supervised the construction of the block system adopted some time ago by that company. He is now sixty-two years old, and is still active and vigorous.

M. D. SHAW FUND.—In addition to the money already subscribed through TELEGRAPH AGE, and previously acknowledged, to the fund now being raised by the Order of Railroad Telegraphers, though Mr. H. B. Perham, its secretary, for the purpose of erecting a monument to the memory of the late M. D. Shaw, a further sum of \$28 has been given by some of Mr. Shaw's old friends, mainly at the New York Herald office, and sent to us by Mr. J. C. Watts. The subscriptions thus far made through this journal amount to \$66. There is urgent need to increase this total in order to speedily carry out the beneficent object in view, and it is hoped that those who are intending to contribute will lose no time in doing so.

New Wireless Telegraphy.

A new system of signalling at sea, by means of which, it is expected, messages can be sent a distance of 500 miles, is to be put into operation by the United States Weather Bureau at Capes Hatteras and Henry. Wireless messages have been sent to Washington, says Willis S. Moore, Chief of the Bureau, from Cobb's Island, seventy miles down the Potomac, and the chief further asserts that the system will be a success on the extended plan. The speed is the same as that of light. The system is said to be distinct from that of Marconi.

Mr. E. S. Derr, formerly manager of the Western Union Telegraph Company, at Allentown, Pa., is now connected with the New York Sun as operator both of the telegraph instrument and monotype. The latter is the latest invention in type-setting machines. During the trial of the Fosschieter murder case at Paterson, N. J., Mr. Derr performed the extraordinary feat of taking the telegraphic report direct from the instrument and, without first making a copy, setting up the matter on the monotype. The Sun's complete report of the famous trial was all put in type in this way.

The Telegraph in the Nineteenth Century.

BY WM. MAVER, JR.

(Concluded from page 58.)

After the public mind had accepted electric telegraphy as a practical success, and overland telegraphy had become firmly established, it was not long before the feasibility of submarine telegraphy was mooted, and in 1850 the first submarine electric cable of any great length was laid between Dover and Calais, a distance of about twenty-four miles. This was followed by the laying of cables of gradually increasing length, until one of seventy-four miles was successfully laid between England and Belgium. The question of connecting Europe and America by cable now became a subject of serious consideration. "Such a scheme," said a writer of that time (1853-54), "is regarded now pretty nearly as that for the electrical connection of the British Islands with each other and with the European continent was regarded some years ago. The sanguine consider the project practicable, and its speedy realization probable. The more phlegmatic notice it only with ridicule. Men of science generally admit the possibility of the enterprise, while men of finance more than doubt the possibility of a remunerative result."

After three discouraging attempts, a cable was, in 1858, laid across the Atlantic, but it was so short lived that those who had previously questioned the feasibility of the enterprise flatly denied that it ever had been successfully operated, and would hardly be convinced even by the affidavits of all concerned in laying and operating the cable.

It was due to the untiring efforts of Cyrus W. Field, of New York, that these various attempts to span the Atlantic with an electric telegraph had been undertaken. Nowise daunted by the repeated failures, he continued his advocacy of the scheme, but the Civil War in this country compelled a temporary abandonment of the project. In 1865 a fourth cable was made, but it, too, was broken and lost while in process of laying, by a sudden lurch of the vessel carrying it, the *Great Eastern*, and it could not be recovered. At each failure, however, new experience was gained, which led to the necessary improvements in making and laying the cable, with the result that in 1866 the work was crowned with success, and an electric telegraph across the Atlantic was an accomplished fact.

At the beginning of this century it was deemed wonderful that the happenings of the day before in the capital of Great Britain could be read at the breakfast table the next morning, thirty miles out of London, the means for this *rapid* dissemination of intelligence being quick relays of horses and stage coaches. By the completion of the Atlantic cable the same thing was made easily possible between points a distance of 6,000 miles apart, and to-day, by the extension of the electric telegraph over every land and under every sea, no part of the civilized world is in point of time one hour removed from any other part. Lest this should be thought an extravagant statement, it may be noted on the authority of Mr. G. G. Ward, that on one

occasion, at least, a *bona fide* business transaction was consummated by means of the electric telegraph between Manchester, England, and Victoria, British Columbia, in one minute and a half.

Between 1850 and 1870, beyond the extension of and improvement in line and cable construction, and in the improvement of apparatus, there was no very marked development in the art of telegraphy. The invention of automatic repeaters in this country, however, in 1848 and 1856, by means of which messages were transferred automatically from the end of one line to the beginning of another, is certainly worthy of passing notice. The Bain chemical system was introduced in 1849 in the United States, and for three years sharply contested the ground with the Morse system, and was seemingly in a fair way to outgrow the latter, when the rival companies were consolidated, after which the Bain system was gradually withdrawn from service. The tendency in this country after 1853 was towards the general employment of the Morse system, and its use in other countries steadily grew. Even the beautiful Wheatstone automatic system, which, beginning with a speed of 60 to 120 words per minute, is now capable of transmitting over 600 words per minute, is a modification, or refinement, of the Morse recording telegraph. In Europe, and especially in France, much use was made of printing telegraph apparatus, the Hughes printer, invented and named after David E. Hughes, of Kentucky, 1855, being much employed. The dial telegraph of Wheatstone, in Great Britain, Breguet's, in France, and Siemens', in Germany, were also in extensive use at this period. The Morse recorder in this country, after some years, gave way almost universally to the now well-known Morse sounder, the latter having been found to be more accurate and speedy than the recorder. Attempts also had been made to increase the existing wire facilities, without changing the methods of operation. As early as 1853 Dr. Gintl, of Austria, had devised a system for sending messages in opposite directions over one wire at the same time. He was followed by Frichen and Siemens-Halske, who invented the now well-known differential duplex method. Stark, of Vienna, invented the first duplex method, a means of transmitting two messages in one direction at one time over one wire. These systems were tried, but were apparently too crude to meet the requirements of successful double transmission. Perhaps the demands for increased facilities at the time did not call for continued efforts to improve them. But whatever the cause, up to 1867 these and other systems "had not found their way to any extent to practical application," and it was said without qualification that such attempts at duplex transmission "must be looked upon as little more than feats of intellectual gymnastics—very beautiful in their way, but quite useless in a practical point of view." These words, written, as they were, by one of the foremost scientific men of that day, were not calculated to encourage efforts in this direction.

Not long after this time, however, J. B. Stearns, of Boston, introduced the duplex telegraph system

which bears his name. This duplex, in its basic principles akin to the Siemens-Halske differential duplex, was introduced upon the telegraph lines of this country, and, after a short time, in 1872, Stearns added to it the condenser, without which the duplex must have remained an impracticable device over long lines. This system at once doubled the existing capacity of every wire on which it was installed, without any change in the Morse system of transmission and reception of messages—a very important feature. The Stearns duplex was followed, in 1874, by the Edison quadruplex, which practically increased fourfold the capacity of every Morse circuit quadruplexed. Some idea of the great value of the duplex telegraph system may be gained if we consider its value in submarine telegraphy alone. As previously remarked, there was but one Atlantic cable in 1868, while to-day there are twelve. But each of these cables is now duplexed so that there is the equivalent of twenty-four Atlantic cables in operation, twelve actual and twelve "phantom" cables. In addition to this remarkable development of submarine telegraphy, it may be noted that a speed of but three or four words per minute was the maximum obtainable across the first Atlantic cable. By the use of more sensitive apparatus and improved methods, due to Sir William Thomson, Muirhead and others, this speed was soon doubled and trebled, until to-day a speed of about twenty-two words per minute in each direction is attained on these cables, and what is true of the Atlantic cables is relatively true of submarine cable telegraphy everywhere.

Among other developments in electric telegraphy in the last quarter of the century have been the Delany multiplex synchronous system, by which six and eight messages may be sent over one wire at the same time; this system is now in operation in Great Britain; Gray's harmonic telegraph, by which at least five messages could be sent over one wire at once; this system was operated in this country, but was not found so well adapted to the needs of the service here as the quadruplex. In this system tuning forks, accurately attuned, respectively, to different rates of vibration, were caused to send electric pulsations over the wire, which pulsations were responded to by correspondingly attuned forks, arranged as armatures of electromagnets placed in the wire. While a particular transmitting fork vibrated its correspondingly attuned receiving fork vibrated, and would cease to vibrate with it. In this way dots and dashes of the Morse alphabet were transmitted. A very important system was invented in 1882 by Van Rysselberghe, of Brussels, by means of which it is possible to telegraph and telephone over the same circuit at once. This system, and modifications of it, are now largely used in this country and elsewhere. An analogous system, the Edison phonoplex, by which messages are transmitted by pulsatory signals, superposed upon the regular Morse system, is also in extensive use in this country. In Great Britain the Wheatstone automatic telegraph is very generally used, especially for press dispatches. The same system is also employed to a considerable extent in the United

States. In France, Baudot's printing telegraph system, by which four messages are transmitted at once, is the established multiplex system. In this country the Buckingham printing telegraph system, which is capable of transmitting 100 words per minute on a wire 500 miles in length, and delivers the message printed on an ordinary telegraph blank, is the latest successful development of printing telegraphy in actual operation in commercial work. The almost general use of the typewriter by Morse operators in the large cities of this country is one of the most recent developments of the art, and one which in a measure offsets the acknowledged demand of the public for a printed message. In addition to the foregoing, there is now an extensive use of the electric telegraph in fire alarms, police telegraph, burglar alarms, railroad signaling, and many other more or less similar systems.

The commercial growth of the electric telegraph is well shown by a comparison of the volume of business now handled with that of, say, forty years ago, when perhaps 10,000,000 messages were sent annually. To-day doubtless twenty to thirty fold that number are annually transmitted over the wires of all countries, the bulk of which are sent by the Morse alphabet. Of telegraph wires there were, in 1840, perhaps 100 miles in Europe and none in this country. To-day there are over 1,000,000 miles of wire in this country alone, a large proportion of which is duplexed and quadruplexed, which adds many hundred thousands of miles of "phantom wire" to the service—wire that, for practical purposes, is as available as the actual wire. And it may be said that what is the case as regards the extension of the telegraph here is relatively the case in the rest of the civilized world, so that to-day the earth is virtually gridironed with wires which, to the large majority of those not directly connected with the industry, have been the only tangible and assumedly the most indispensable part of the electric telegraph of which they possessed any knowledge.

It was little wonder, then, that the every-day world stood still in amazement when, four years ago, the announcement was heralded that a system of telegraphy had been invented in which wires were dispensed with, and in which that mysterious something, the ether, was utilized, and by which messages were transmitted across miles of free space. Nor, although the scientific world had been measurably prepared for the announcement of the work of Hertz, Branly and Lodge, was it much less lost in wonderment. Not so much, perhaps, at what Marconi had actually achieved, as at what the achievement portended for science.

The invention of Marconi's wireless telegraph system was no exception to the rule which the inventions of other electric telegraphs had followed. Hertz, in 1884, in pursuing his masterly experiments, had demonstrated the accuracy of Maxwell's prediction that electric waves existed in free space. Hertz used a Righi oscillator to set up electric waves. This consisted of a powerful induction coil, the terminals of the secondary wire being connected with two brass balls, between which a succession of sparks jumped while the coil was in

operation. For a receiver, Hertz used a ring or quadrangle of copper wire broken at one point. Holding this wire a few feet from the spark gap of the oscillator, the room being darkened, he perceived sparks jumping across the break in the wire, these being due to electric oscillations set up in the wire by the waves radiated from the oscillator. Branly had shown that in the presence of electric waves, metallic filings were affected in such way that their electrical resistance was lowered, and that when the waves ceased, and the filings were shaken, they resumed their former electrical condition. Here was the equivalent of a key in a Morse circuit. Lodge had shown that the electric waves thus set up, acting upon a Branly "coherer," could be caused to operate an electric bell at a distance of many feet.

Taking advantage of these discoveries, and employing the principles of the Righi oscillator, the Branly coherer and his own discovery—the vertical wires at the sending and receiving stations—together with other refinements of apparatus, Marconi has succeeded in transmitting messages a distance, in clear space, of over sixty miles. There were others who, like Preece, had succeeded in telegraphing across rivers and bays to a distance of three to six miles, by electro-magnetic induction, using telephones as receivers; but, remarkable as such results are, they have not awakened a tithe of the interest aroused by the announcement of the results obtained by the Marconi wireless telegraph, doubtless the most notable development of the electric telegraph in the nineteenth century.

Comparing our present knowledge of things scientific with that at the beginning of this century, when, for example, "the man rash enough to have predicted that within fifty years it would be possible to send a message by lightning from London to Vienna would have been considered intellectually deranged," what limits shall we place upon progress in any direction during the coming century?

Is it too much to predict that within the next one hundred years even mental telegraphy—the direct transmission of intelligence from mind to mind—may be an accomplished fact. Seemingly it requires no greater fertility of imagination for us of this day to conceive of such a thing than would have been required of our forerunners of a century ago to have conceived of wireless telegraphy. For if, as we must believe, we live in and are imbedded in the all-pervading ether; if it be assumed that every thought of man sets up a particular vibration in the brain cells, then these vibrations may be transmitted to this ether. Minute such vibrations may be, but, granting this, how exceedingly sensitive, on the other hand, must the brain cells be, which, through the retina, respond to the faint undulations of the ether due to the light from the star trillions and trillions of miles remote. If, then, the brain cells of one are, perchance, attuned to harmony with the brain cells of another, why may not the respective cells vibrate in unison with each other, the ether being the medium of communication, and thus produce a common thought. At least, the occasions, seemingly too frequent to be classed

as coincidences, when similar thoughts in nearby and remote individuals have simultaneously occurred, would lead, and, indeed, in the minds of many have led, to a belief in the possibility of mental telegraphy. But whether this belief may be realized in the near or remote future, and, granting its possibility, we can only say that the means by which such direct communication from mind to mind may be accomplished, *at will*, is beyond our present ken.—Electrical Review.

The Employment of Women in the Telegraph Service in Foreign Countries.

The International Telegraph Bureau, of Berne, Switzerland, has issued an interesting report on the employment of women in the telegraph and telephone services of those countries belonging to the International Union, from which the following abstract is made by H. L. Geissel in the *Electrical World and Engineer*:

The admission of women to the telegraph service dates back about thirty years. The admission of females was chiefly caused by the steady reduction of the rates of the telegrams and the resulting necessity of cheaper labor, but also on account of the fact that women were better fitted for the telephone service than men. Of the countries now belonging to the International Telegraph Union, thirty-two employ to a greater or smaller extent women in the telegraph and telephone service, while only ten administrations so far do not admit women, namely: Bosnia-Herzegovina, Egypt, Greece, Luxemburg, Montenegro, Natal, New Caledonia, Tunis, Turkey and Siam. In Belgium and Spain women are still employed in the telegraph service, but new appointments are not made any longer.

The regulations for the admission of women to the service in the different countries have only the one common point, that the appointees must be citizens of the respective country. Though not specially mentioned, yet it is generally understood that all persons to be admitted must have a clean record and good health. In some countries, such as Germany, Austria-Hungary, Switzerland and others, only persons without any bodily defect are admitted, while in France the authorities demand further that the applicants have a minimum height of 1.50 meters (five feet), the same minimum height being required in England for positions in provincial cities, towns and villages. German and French regulations also demand that the applicants be never fined or punished by any public court, and another additional prime condition to admission in Germany is that the applicants must be absolutely free of debts. One single country, Victoria, demands that the applicants be life-insured. The admissible minimum age varies in the different countries between fourteen and eighteen years, and the maximum age, wherever stipulated, forty-five years; Germany makes in so far an exception as it fixes the maximum age for admission at thirty years. In Germany, Bulgaria, Holland, Roumania, Japan, New South Wales, New Zealand and Victoria the applicants must either be unmarried or childless widows. Other countries, like Russia and England, only demand that the can-

didates be unmarried or widows, which was also the case in Spain as long as women were admitted. The French regulations do not contain special paragraphs relating to civil life, and married women, girls, widows, as well as divorced women, are admitted to the service. As a rule, however, women have to quit the service after they get married. In Sweden, the employee may remain in the service after marriage, if the husband is also employed in the telegraph service, and the same is the case in Russia, Roumania, Bulgaria and New South Wales. Only in Belgium the female employees are allowed to marry. In Italy, only those female employees who have been appointed superintendents are allowed to stay in the service after marriage, while in England those employees who marry receive on retiring an indemnification in the form of a month's salary for each year of active service. In some countries widows and orphans, as well as daughters, sisters and wives of employees are given preference to any other applicants.

As far as educational questions are concerned, the regulations of almost all countries demand in the first place a perfect knowledge of the mother language, in reading and writing, and a good general knowledge acquired at school. Some countries demand besides a certain geographical knowledge, while in Italy the candidates must speak and write Italian and French; the same is the case in Holland, where, furthermore, a certain elementary knowledge of the German and English languages is required. Swedish regulations, too, prescribe a certain knowledge of French, English and German.

The average working time in the different countries varies between seven and eight hours. In many countries women are employed during day hours, while at night time men take their place.

A Greeley Episode.

A bit of election news was accidentally left out of the Weekly Tribune, when Greeley told the editor that he was a "d— blockhead." The editor at once resigned, but was sent for a day or two after.

"I understand, sir," said Greeley, "that you have refused to edit the Weekly because I called you a d— blockhead. Now, don't be foolish, and go back to work. I wouldn't give a button for any man who had been on the Tribune three weeks without being called a d— blockhead. Sometimes I'm a d— blockhead myself."

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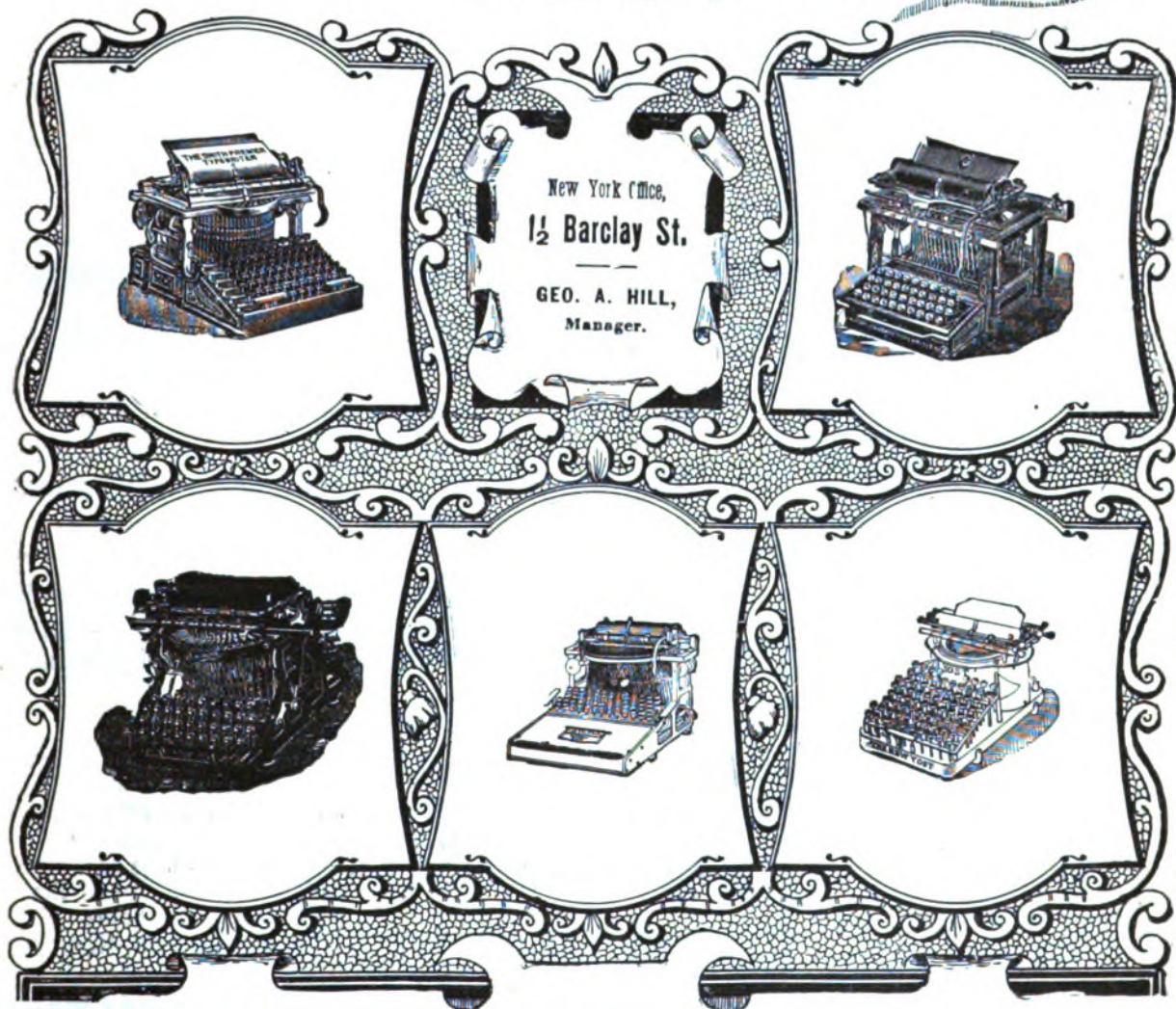
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A Manila report states that during the last month the cable ship Burnside was to have begun the laying of 600 miles of cable, connecting Negros, Mindanao and Jolo. Much annoyance has been caused among the Philippine Islands by cutting off cables and telegraph lines.

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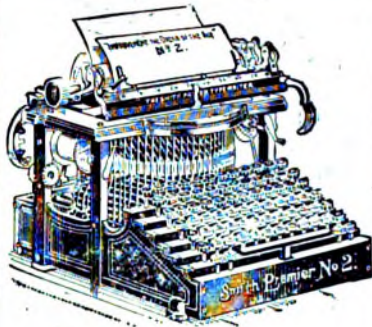
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NEW YORK, February 16, 1901.

Government Telegraph in Canada.

It is stated that the Dominion of Canada is preparing to take under Government control the telegraph systems of that country. Should this plan be consummated, it would be but following the example long since established by England, the mother country, and also carried out in other of her colonies. It has been said that under Governmental direction the cost of telegraphic communication would be lessened and that greater efficiency in the service would be secured. Experience proves to the contrary, for if these conclusions are based on the English experiment such results would not be altogether realized. In densely populated Great Britain, while the cost of sending a message may have become minimized, the service itself shows that it is far from measuring up to the needs of its patrons. The English newspapers have been severe sufferers at the hands of their Government telegraph in the delay and lax methods employed in the transmission of press matter, and all commercial business has felt the urgent need of greater efficiency in telegraph management. It is a condition that we here in the United States would regard as intolerable. Why Canada, especially in view of its Republican proclivities and methods of doing business, more akin to those of this country, should seek to emulate an example that has proved to be exceptionally bad, it is difficult to understand. As a rule, private enterprise is progressive and alert, fully alive to the need of meeting every demand and emergency, while Governmental operation too frequently means comparative inefficiency because too slow.

Should the Canadian Government, however, acquire the telegraphs of that country, as well as the telephone systems, as is also stated, such an extension of Government ownership would become an interesting object lesson to those who dwell on this side of the international boundary line.

A Mental Anguish Bill.

Down in South Carolina the Legislature is wrestling with a "mental anguish bill," directed against telegraph companies. The bill introduced in the present Legislature, and which is likely to become a law, provides: "That from and after the passage of this act, all telegraph companies doing business in this State shall be liable in damages for mental anguish or suffering, even in the absence of bodily injury, for negligence in receiving, transmitting or delivering messages. That nothing contained in this act shall abridge the rights or remedies now provided by law against telegraph companies, and the rights and remedies provided for by this act shall be in addition to those now existing. That in all actions under this act the jury may award such damages as they conclude resulted from negligence of said telegraph companies."

Of course, it is understood that the telegraph companies are all giant monopolies, and should be sued on the same general principle that you should sue a railroad company.

But why should this thing be aimed exclusively at telegraph companies? Why not include in it other things? Why not have a bill that would apply to milliners? Imagine the mental anguish a man suffers, living in dread that a milliner will exhibit a hat—an Easter bonnet say—that will cause his wife to want to purchase it, and she does so, and the bill is liable to be rendered at an inopportune moment? Should there not be some kind of damages for such mental anguish as that? It strikes us as being decidedly proper for a bill of that kind, and a memorial should at once be sent to our Legislature, indorsed by the Business Men's Association, looking to the relief of this kind. Mental anguish is something that should be anticipated and averted, if possible.

And there should be a mental anguish law against young ladies receiving rings and presents from young gentlemen, unless they intend to reciprocate their love. Imagine the mental anguish of a young man, alone in the world, who blows in his last sou for a beautiful present for his darling—and does not know whether it will be returned a few months later. True, young ladies do not have bank accounts, always, like the greedy and grasping monopolies—but the judgment should be made possible, and not only the mental anguish but the flirting would cease.

The mental anguish act should apply to a saloon keeper as well. Think of the mental anguish of the fellow who blows in his last dime late at night, and cannot sleep, wondering whether or not he can get a morning bracer. But it were useless to enumerate. All through the affairs of human life there is a lot of mental anguish which the law does not undertake to compensate. And just why a telegraph company should be held up as a fitting subject to swipe for damages is more than we can understand. But as the mental anguish crusade is on—let it continue, and finally in its fullness and its philosophy apply to Mrs. Carrie Nation.—Danville, Va., Bee.

CABLE MANUFACTURE IN THE UNITED STATES.*

BY WM. MAVER, JR.

(Concluded from page 51.)

In preparing the lead and machine for the operation of lead-covering the insulation, the operation is practically as follows: The hydraulic ram is dropped down, and carries the die block and cylinder with it, withdrawing the cylinder from the lead plunger, which is stationary. The cylinder is then filled with molten lead, which is termed a "charge." As it is not desirable to place the lead in a melted state over the insulation, the charge is allowed to chill somewhat before the operation of covering is begun. The time for this varies with the size of the cable, and may be from three minutes to four minutes. To prevent undue chilling of the lead, gas jets are placed around the cylinder. At the proper time hydraulic pressure is slowly applied to the ram. The pressure exerted on the end of this ram, which, in some cases, amounts to five hundred tons, causes the cylinder to rise up against the plunger, with the result that the lead is pressed down into the die, forming a tube or casing around the insulated conductor. At the same time, by suitable take-up reels, the cable is drawn through the die block. In other types of lead-covering machines the hydraulic pressure is applied from the top.

The lead is frequently alloyed with a small percentage of tin, about two per cent. This was done originally to protect the lead from the attack of acids, etc., but its utility in this respect is questionable. The tin, however, adds a certain amount of rigidity to the cable, which is useful in facilitating the operation of drawing it into the underground ducts. The tin, at the same time, adds a difficulty to the process of lead-covering the cable, the small percentage above mentioned almost doubling the pressure that would be required to put on the lead pure. The rate at which the cable may be lead-covered depends largely on the size of the cable, ranging from a few feet per minute, in the case of large cables, to several hundred feet per minute for the smaller cables.

The cable is now practically ready for drawing into the underground ducts. Some of the manufacturers of high-tension cables, however, first subject them to a severe breaking-down, or puncture test, by applying an electrical pressure from one and a half to three or four times the pressure to which the cable will be subjected in actual service. The pressure test varies with the length of time the test is to be applied. Thus, a cable designed to withstand a working pressure of 500 volts may be subjected to a pressure of 2,500 volts for one hour, or to 4,000 volts for a few moments. If intended to withstand a working pressure of 10,000 volts, it may be subjected to 15,000 volts for one hour or to an instantaneous pressure of 30,000 volts. The high pressures for these tests are developed by means of an alternating-current gen-

erator and step-up transformers. When the apparatus is ready, the wires leading from it are connected to the conductor, and to the lead cover of the cable, respectively. In the case of rubber cables, these tests are sometimes applied before the lead cover is put on, the cable being immersed in a tank of water. The ends of the cable are, of course, kept out of the water. In this latter case the wires run from the testing machine to the conductor of the cable and to the water in which the cable is immersed. If the cable is defective at any point, or if the pressure is too great for the inherent puncture-resisting quality of the insulating material, the current will "jump" and puncture the cable.

At such high pressures it is obviously essential that much care should be exercised in making these tests. The lead is removed, in the case of rubber cables, for a distance of several inches from the ends of the cable, as, otherwise, when a pressure of 20,000 volts or 25,000 volts is reached, the electricity will creep along the surface of the insulation (as it may be seen to do, also, on a sheet of thick glass subjected to high pressures), thereby reducing the tension of the current.

The maximum electromotive force used in the city of New York on underground cables is about 6,600 volts. This is employed by the electric traction and electric lighting companies. The longest circuit on which this pressure is used, measures about ten miles, while many other circuits range from one mile to five miles and six miles in length. The maximum electrical energy transmitted over these circuits from the power-houses to the various sub-stations, or points of distribution, ranges from 1,300 H.P. to 2,700 H.P. Both rubber and paper cables are employed for this service. The dimensions of one of these cables may be given; for instance, a three-conductor cable, rubber, now operating at 6,600 volts. Each conductor is made up of thirty-seven copper wires, giving a total cross-section of 250,000 circular mils, equal to 0.5 inches diameter. The thickness of the rubber insulating wall around each conductor is $\frac{3}{8}$ inch. This is a rubber-jacketed, or "split" insulation cable. The jacket is also $\frac{3}{8}$ inch thick. This ensures $\frac{1}{2}$ inch of rubber compound between conductors, and between any conductor and the ground. Each conductor, and also the jacket, is covered with a tape, put on spirally outside the rubber. The lead-covering of this cable is $\frac{1}{2}$ inch thick. The outside diameter of the cable is 2.56 inches. The interstices between the conductors are filled in with jute.

The highest working pressure for underground cables thus far proposed is that soon to be operated by a western company in the United States. This company has an electric plant, driven by water-power, from which the current is to be transmitted at a pressure of 25,000 volts, on overhead wires, a distance of about twenty miles to the city limits. From this point to the point of distribution in the city the power is to be transmitted through underground cables, at the same pressure, a distance of three miles. This cable consists of three stranded

*Abstract of an article on "Electric Cables for High Tension Service, How They are Made and Tested in the United States," in Cassier's Magazine.

conductors, each of No. 2 B. & S. gauge. The thickness of insulation around each conductor is $\frac{7}{32}$ inch, and the thickness of the jacket is $\frac{1}{32}$ inch. The cable is lead covered.

Inasmuch as some authorities consider that 40,000 volts represent the maximum electrical pressure that can be advantageously employed on overhead lines for the transmission of electrical energy on a large scale, it is thought that the safe maximum pressure for underground cables has, perhaps, been reached, if not exceeded, in the installation referred to, owing to the difficulties to be encountered in maintaining the insulation at such high pressures. The operation of this circuit will be watched with much interest, and doubtless by its success or failure the pressure of subsequent installations of a like nature will be measurably gauged.

A CHOLLY-LULU.

BY L. C. HALL.

With head bent low over his daily account sheet, the worried receiving clerk was vainly endeavoring to reconcile his cash balance of sixty-seven eighty with the book-keeper's charge against him of seventy-three ninety-one. For the time being he was oblivious to all else. However, his dream of possible errors in the book-keeper's addition was sharply disturbed by a peculiar voice that seemed to come from above the top of the iron grating which surmounted the counter. "Is the New York rate 35?" it queried.

The receiver's chin jerked forward and he looked up bewildered, up and up, the height of a tall and incredibly slender body, until his astonished eyes rested upon the wizened, waxey face at its summit. For a full minute he made no answer, but instead he took in the figure of the person who owned the voice, running his eye rapidly up and down that part of the tall, willowy body visible above the level of the high counter. With a kind of amused wonderment he noted the miniature, close-brimmed, light fedora that perched jauntily on top of the small closely-cropped round head; the sharp, rather puny features; the high collar and gaudy cravat that circled the thin long neck; and the extraordinary cut of the light, loose-fitting overcoat which enveloped the wonderfully elongated body.

His survey finished, the clerk muttered to himself: "Great Cæsar! what a specimen of a man, or boy, he is," for the little old face might have belonged to either youth or adult. Aloud he finally replied:

"Yes, sir; 35 cents and a stamp."

The willowy form glided over to the writing counter, took up a pen and began writing a telegram. As one man, the receiver and all the other clerks arose from their seats and gazed over the counter in order to get a view of the remarkable pair of legs which they felt ought to go with so remarkable a body; a body that looked, indeed, like the five o'clock shadow of the office pole outside.

What was their greater amazement at seeing that, instead of a pair of long-drawn-out trousers, the person wore a narrow, clinging skirt, and that the overcoat was scalloped at the bottom in the latest feminine fashion.

The clerks gazed unanimously, mouths open, for a moment; then their jaws closed and they dropped again, as one man, back into their seats. For a little while thereafter they looked at each other in stupid silence. "What-er-er is it?" the telephone clerk gasped, thus breaking the spell.

It was a question not easily answered. The face, though smooth and beardless, was decidedly masculine in expression; and, while the voice was a clear tenor, the manner, gesture, and upper part of the dress were distinctly that of a man, a very freak of a man, to be sure, but one would have sworn to the sex. Indeed, so sure on that point had been the receiving clerk that he gave unconscious expression to his conviction in answering the question about the rate.

And yet, there were the fluted overcoat tails and the long skirt to be accounted for. Who, or what, on earth could he, she or it, be?

As the mysterious person continued to write, with back turned to the nonplussed clerks, the discussion over the writer's sex and queer make-up went forward in animated fashion. Some of the clerks contended for masculinity, while others persisted in doubting the plain evidence of their senses and stuck to the feminine side of the debate.

"Tell you what," said the book-keeper, an idea striking him, "let's see how the telegram is signed; the sig. ought to tell whether the sender's a she or a he."

Soon the telegram was written, presented to the receiver, stamped and paid for. And before the odd-looking figure had time to float, in queer undulations, out of the door, every man in the front office had gathered about the still bewildered receiver to get a look at the stranger's message.

Singularly enough, the handwriting was indeterminate; it might have been that of either man or woman. As for the telegram itself, it served in no way to lighten up the gloom of doubt surrounding the sex of its sender. It was addressed to Mrs. Frank Jones, and was signed simply "Frank."

Seeing this the clerks again looked at each other perplexed and amazed. Here was a woman, dressed, in part at least, like a man, sending a telegram to someone's wife and signing the name of a husband. What could be the solution of such a riddle?

Was the writer a man after all? and if so, why was he disguised as a woman? Was the addressee, Mrs. Frank, his wife or his mother?—his features were such that he might have passed for either husband or son. Or, was the writer in fact a woman, and was she sending the telegram in another's name? These and other questions were asked in the discussion that followed.

The delivery clerk suggested that Mrs. Frank might be the writer's mother, and the writer's own name Frances. "Frank is probably a pet name," he ventured. But the suggestion seemed

too far-fetched to satisfy the intelligence even of the cross-eyed office boy.

There still remained but one chance of being able to solve the problem; the message, in its context, requested an answer and it was possible that that might give some clue to the sex of the stranger. "Let us keep a watch for the reply," said someone to the delivery clerk; "don't let it get by you, or the gang'll sandbag you."

The reply was long in coming, but it turned up at last along towards eight o'clock. It was addressed to "Frank Jones, The Vaudeville."

Again the clerical force was in a flurry. "Here, Henry VIII," said the delivery clerk to the fattest messenger in the "pen," "take this message to The Vaudeville and keep your eyes skinned. We want to find out if this person is man, woman, or what. It's just about dressin' time, and they may send you back into the green-room. If they do, you can size her up. Anyhow you get a program and stay until she comes on for her act. Get a move on, now, and lemme know what you find out as soon as you can."

In the interval there was no abatement of the interest in the outcome of the investigation. Time passed slowly, as if the clerks were waiting for a long deferred pay-day. During the wait wagers were laid, even the messengers putting up a part of their collections on the issue of the fat boy's mission.

In an hour or so, Henry VIII rolled in, puffing. In a moment he was surrounded.

"See her—nim?" the delivery clerk asked, breathlessly.

"Yep. Trapeze artist. Dressed in tights."

"Dressed in—Good Lawd! Imagine such a thing in tights," said the receiver.

"How was she down on the bill?" asked the delivery clerk.

"As Signorina Slimletti; but that don't prove nuthin'—specially at the Waudewille."

"Didn't she have—er—did you get onto her curves?"

"Didn't have no curves. Straight as a cross-arm," replied Henry VIII.

"Well, then, is he a she, or is she a he?" persisted the questioner.

"Dunno."

"What d'you think?"

"Think her's a Cholly-Lulu."

"What's a Cholly-Lulu?"

"Don't you know what a Cholly-Lulu is?"

"No."

"Well, nuther do I—onless" with a wink, "it's one of them jays what makes six dots for a P."

And thus the question stands, for to this day the sex of the queer stranger remains a mystery unsolved. And for want of some better way to dispose of the problem, we have agreed to treat it as a permanent office conundrum, recording it as such on the virgin pages of the general "log." It is, in truth, another version of the story of "The Lady or the Tiger," with no man among us wise enough to lit aside the veil of doubt.

The Boston Ball.

The sixteenth annual ball of the Telegraphers' Mutual Aid Association of Boston, Mass., was held in Mechanic's Hall, that city, on Friday evening, January 25. Rarely has the hall presented a merrier scene and seldom have such elaborate decorations adorned its walls. Above the stage were large pictures of Professor Morse and Thomas A. Edison, and grouped between the two was the motto of the association, with the synonymy of good fellowship, "73," in massive figures of gold five feet deep.

Mr. Frank J. Flynn, of the "Globe," was floor director, and with Mrs. Flynn led the grand march followed by one hundred and fifty couples. Dancing was enjoyed from ten to three, with a short intermission for supper at midnight.

Nearly \$700 was added to the reserve fund of the society and much credit for the successful outcome of the ball is due to the untiring efforts of the President, Michael F. Hart, who acted as chairman of the ball committee.



PRESIDENT MICHAEL F. HART.
Chairman of the Boston Ball Committee.

Among the invited guests present were: Mr. and Mrs. J. W. Larish, Miss Larish, Mr. William E. Durgin, Mr. and Mrs. J. A. Dougher, Mr. W. J. Anthony, Mr. Jeremiah Shaw, Mr. W. E. Bunker, Mr. and Mrs. M. C. Harrington, Mr. J. H. Burke, Mr. and Mrs. C. E. Lyman, Mr. and Mrs. F. T. Viles, Mr. D. A. Lamont, Mr. and Mrs. C. A. Richardson and Mr. J. J. Muldoon.

Others present were: Mr. D. J. Kelleher, Miss Margaret M. Doyle, Mr. P. J. Farrell, Mr. George Cunningham, Misses Cunningham, Mr. David Bailly, Mr. D. Connell, Miss Nellie Bean, Mr. and Mrs. J. A. Molloy, Mr. and Mrs. P. J. Beasty, Mr. and Mrs. H. L. Flynn, Mr. A. V. Losea, Mr. and Mrs. Daniel Carter, Mr. T. C. Devine, Mr. C. A. McManus, Mr. and Mrs. Ellis Gordon, Mr. R. E. Tobin, Mr. J. J. A. Gilrain, Mr. L. J. Reynolds,

Mr. and Mrs. A. V. Mann, Mr. M. F. Finn, Mr. P. J. Farrell, Mr. and Mrs. C. W. Rice, Miss Mary Severance, and Miss Julia Herbert.

Mr. Dooley Reviews the Century.

The progress of the century is most humorously reviewed by the clever Mr. Dooley as follows:

"Great happenin's has me an' you an' th' ithers seen in these wan hundherd years, an' Great Britain has had so many geenuses that Mack is buildin' a new patent office to Wash'n'ton. . . . In me toime, Hinmissy, Oi've seen manny wondherful in-vinshuns interjooiced. Oi've seen th' tillyphone put into iv'ry house, be which ye c'n talk to yure naybur acrost th' sstrate whin his number's not ingaged. Th' tillyphone is raysponsible f'r th' prisint over-crowdin' iv hell, an' th' gover'mint had to find a rimidy be diggin' up all th' r-roads an' startin' an opposishun. Oi've seen th' phonygraph invinted twict be th' sage iv Menloo Par-rk, an' no fam'ly's complate without one. Whiniver a man dies he has a wax cylindher put into his coffin with a message to his ancesthors wan thousand years hince. Oi've seen th' gr-reat invintions iv Perfessors Gilbert an' Sullivan in me toime fr'm Japanese mirrors to arc lamps. Phwat man don't kape a telpher line in his back gardin f'r hangin' th' close an' bringin' up th' pertaties? Secolmeters are at iv'ry corner iv th' sstrates ladin' out self-induchshun, an' magnifyin' springs is to be bought in iv'ry sshore. Glory be, an' whin Oi call to moinde th' sstrate kyars pulled be horses which was fur-rest cousins to th' sausages in Schwartzmeister's windy, an' see before me th' electric kyars an' th' ought-to-me-billies toot-tootin' an' runnin' down folks at iv'ry corner, me heart fills with pride, Hinmissy, to know that Oi'm livin' in th' ninetyeth cintury an' assistin' to make th' gr-reat elictric age. . . . Oi till ye phwat, Hinmissy, th' nixt cintury will be a perspirin', awr-fillin' existence, pliwat with toobes undher th' earth shakin' th' houses an' makin' their rints to fall—an' flyin' machines knockin' down th' chimley-pots an' dhroppin' folks into th' back yards—an' submar-rines scuttlin' all th' r-river steamers an' landin' furrin ar-mies in th' Regent's Canal—an' messages fr'm Mars—an' coal givin' out—an' th' sun gittin' smaller—an' th' Yeller Per-ril—an' ars'nic in whisky—an' compul-sory cree-mayshun—an' sperrits—an'—."

"Merciful hivins!" exclaimed Mr. Hennessy, who was as white as a sheet, "whin did th' new cintury begin?"

Sir William Preece Refers to His Boyhood Days.

Sir William Preece, one of the ablest and most eminent practical electrical engineers of the day, has been writing of his youth. Among Sir William Preece's inventions it is probable that his wireless telegraphy and telephone will rank the highest. Sir William introduced a wireless telegraph, based on inductions, in 1884, ten years in advance of Marconi, and his method is now in daily use by the English Post Office. Moreover, it is the only wireless telephone in existence—that is to say, the only system for transmitting speech through the ether.

"My parents made a great mistake," he said once.

"I should have been a musician." Without questioning his Welsh musical gift, his parents were not so far amiss in making him an engineer. He certainly looks the engineer. Over the middle height, he is of a square, athletic build, and active habit, the sort of a man who can go anywhere and do anything. His face is massive and gives an impression of solidity, relieved by his large, intelligent brown eyes, his fine forehead and a mixture of good humor, sagacity and bonhomie. He is a broad, kindly, human sort of a man, without any stiffness or affectation, and with whom all, even the most diffident or youthful, can feel at home.

There is much more in Sir William than the engineer and man of science. There is a vein of romance and poetry, not to speak of music, which, though not obtruded, yet ever makes itself felt. He is practical, but it is easy to see that he might have excelled as a writer and a public speaker had he chosen. As it is, he is admittedly the best speaker in the electrical profession of England. Another talent of his, though less apparent, is administrative capacity. Sir William possesses the gift of reading men, choosing them and setting them to work for him without any trouble.

Sir William tells this story of his first lesson in science: "I was walking with my father along the banks of the River Seiont, that debouches into the Menai Straits at Carnarvon, my native place. I was then eight years old. We heard the sounds of a blast in the slate quarries in the mountains near Llanberis. I asked, 'How is it we hear those sounds from such a distance?'—the distance was eight miles. 'Look here, my boy,' said my father, chucking a stone into a placid pool of the river, 'see how the water is disturbed. See how I have excited waves in it, and how those waves progress in circles with definite velocity, and'—putting his hand in the water—'I feel those waves breaking against the back of my hand. The air, although you cannot see it, is as material as the water. You feel it in every puff of wind, and see it in every bending bough. The explosion of gunpowder in the quarry has disturbed this medium as the stone disturbed the water. Waves of air have been excited, they have speeded from Llanberis here, they have broken inside your ear, and they have given you that sensation which we call sound.'

"The house in which I was born was built on ground associated with the name of Helen, the mother of the great Emperor Constantine. It was called Bryn Helen. Close behind us was a fine, well-preserved specimen of the wall which surrounded the Roman fortress Segontium. In front of us was the magnificent Norman castle of Carnarvon, built by Edward I., in which the first Prince of Wales was born, in 1284. The presence of the Roman and Norman is evident everywhere about the beautiful country between the Snowdonian range and the sea. Dinases—the intrenched kopjes of the Roman—and the round stone tower of the Norman, still exist—imperishable evidences of the determined opposition to oppression and the love of freedom of the ancient Briton.

"I love to show my American friends these markings in the rocks of time. 'Why,' said one, inside

the old castle, 'to think this was built and inhabited by courtly lords and ladies before America was discovered!'

"My connection with telegraphy began in 1852, and not in the days of my youth. It was brought into great prominence in 1845 by the capture at Paddington of a great murderer—Tawell—a Quaker, who had poisoned his paramour at Slough. Tawell nearly escaped, for the instrument could not give the letter Q. Tawell was described as a 'Kwaker,' which the receiving clerk had great trouble in deciphering.

"I was very early introduced to the realm of science in the lecture theatre of the Royal Institution. Faraday was then in his prime. His lectures on a 'Candle' contained more of romance to me than all the operas, plays and books that I was allowed to see and read. The summit of my ambition was to become his assistant, and this was realized in 1853."

The Signal Service Corps in China.

In the report of the chief signal officer of the American Signal Corps, operating in the Far East, after describing the early part of the work done by Col. James Allen to get an equipment from Manila to China and to Tientsin, the following interesting detail is given:

The conditions under which these operations were conducted in the field were most trying. They entailed not only marching as fast as the army and the construction of a telegraph line equal in length to the daily marches, but also the establishment of telegraph stations at night, their dismantling in the morning, and the dispatch of telegrams during a considerable part of the night. The difficulties were greatly enhanced by the fact that for days at a time the detachment was obliged to work without escort or any protection other than reliance on its own members.

Most unfortunately, this labor, exhausting at the best, was done under most unfavorable climatic conditions, the heat being so excessive as to frequently disable for hours the most energetic men of the Signal Corps. Many of the Chinese laborers were prostrated, and in one day two of them dropped dead from heat and over-exertion.

Lieut. Stamford was alive to the necessities of the occasion, realizing that the nearest telegraphic force was two days behind him. This was the military telegraph organization of the Japanese army, which, being near home, not only had its full equipment, but also a force of 100 enlisted men and 20 or more army carts. As it was, all telegraphic reports of advance operations of the allied armies in the march to Peking necessarily passed over the Signal Corps line. The occupation of Peking was thus reported.

It is to be added that during the advance the first information as to the capture of Yangtsun, on August 6, was received from Major Scriven, Signal Corps, although his telegram of that day was delayed three days in transmission—doubtless owing to the demoralized and congested condition of the Chinese land lines between Chefoo and Shanghai.

In view of the trying and unfavorable conditions recited, it is a source of gratification that the Signal Corps detachment justified the confidence placed in it by General Chaffee and by the chief signal officer. Through the labors of Lieutenant Stamford's men, the American army carried the first telegraphic wire into Peking, where the first telegraph office was installed in the house of Minister Conger.

Fortunately, this action permitted General Chaffee, in Peking, to extend courtesies, in the way of transmitting telegrams, to officials of the British, Russian, French, German, Italian and even Chinese governments, and likewise to the press.

So strenuous were the labors of the enlisted Signal Corps men, both before and after their arrival at Peking, that it was with difficulty that telegraphic work was maintained at Peking, owing to the large number of operators incapacitated by sickness.

Governmental Control of the Telegraph.

It is reported that the Dominion Government is considering the advisability of purchasing the telegraph systems of Canada, extending them enormously and operating them in connection with the postoffice department. It is also stated that it is seriously proposed to follow a similar course with the telephone, but in the case of the latter municipalities will be licensed, as in Great Britain, to operate the system within their own areas.

The Great Northwestern Telegraph Company and the Canadian Pacific Railroad Company practically control all the wires in Canada. The valuation of the property of both concerns, it is also said, is being made very quietly, and, should the arrangements between the Government and these two companies be complete on an early date, a bill dealing with the subject will go before the next session of the Dominion Parliament. To accomplish the purpose would involve the expenditure probably of from \$20,000,000 to \$25,000,000.

The Center of Population in the United States.

The center of the population in the United States is now at a point in latitude 29 degrees 9 minutes 36 seconds north, and longitude 85 degrees 48 minutes 54 seconds west, which point is in Southern Indiana, about seven miles southeast of the city of Columbus. Since the last census of 1890 the center of population has moved westward about fourteen miles, and south about three miles.

A special cable dispatch of January 30 from Berlin says: "Professor Slaby, of the Technische Hochschule, said in an interview to-day that he expected to revolutionize telegraphy if he was successful in applying his etheric system, which he calls spark telegraphy, to the present system of transmission by wire. He added that thousands of telegrams could then be transmitted simultaneously by the same wire."

TELEGRAPH AGE should go regularly to every one interested in the telegraph.

Strange Railroad Coincidence.

A most remarkable coincidence, probably without precedent in railroad circles, has just come to light in connection with the accident on the Grand Trunk road, near Bethel, Me., which occurred early in the morning on January 18, says the Portland, Me., Express. At first thought the statement that the officials of the road were preparing to take care of the wreckage before the collision actually took place might appear improbable. Not only did they know of the accident in advance, but before the fatal smash-up they actually had two wrecking trains rushing at full speed to the scene. It all happened in a peculiar way, and has furnished a topic for unusual interest among the officials and workmen in the local yard of the Grand Trunk Railroad.

Road Superintendent Jones, between Portland and Montreal, happened to be at the telegraph key at the Portland office when he heard the operator at Shelburne send "freight away," meaning that the train had left that station. Like a flash the superintendent grasped the situation, knowing that a heavily loaded train was pushing on at full speed in the opposite direction on the same track.

There were two wrecking trains attending to slight troubles on the line, one being occupied with a car off the rail at Falmouth, and the other to the westward of Bethel. It happened, fortunately, that in each instance the work assigned to these trains had just been finished when the engineers received word from Superintendent Jones to hasten to Bethel.

The train at Falmouth made a hasty departure for the scene of the pending wreck, not waiting to pick up the regular wrecking crew, but depending on enlisting volunteers at the scene of the accident.

It is needless to say that the nerves of the operators along the line who caught Superintendent Jones's orders were keyed to high pitch. They realized that the throttles of the two wrecking engines, rushing from opposite directions toward Bethel, were pulled wide open, and they also realized that two engines with heavily burdened trains, representing thousands of dollars worth of labor, and freight to the value of many times that amount, were plunging toward each other on the same rails.

With every nerve strained to the limit, the operators along the line caught the climax by a flash at their tables. They realized the crash had come and that the wires went down in the wreck.

"It was enough to give the operators nervous prostration," said one railroad man, discussing the matter to-day, "realizing, as they did, that an awful accident was pending and that they were helpless to prevent it."

The dispatch with which Mr. Jones took action saved the road many hours of delay in the traffic, which at this busy time of the year means so much to the Grand Trunk road.

Laying the First Ocean Cable.

Half a century ago the first messages sent by a submarine cable passed between Dover, England, and the coast of France. Science had again redeemed herself from the calumnies of ignorance, and what had before been popularly considered a wild and baseless chimera had become at length an established truth.

There is something fascinating, almost romantic, in the birth and development of all great discoveries. To trace the perfected system back to its original inception is like the exploration of some mighty river to its foundation head. The noble stream along whose shores great cities spring into existence as if by magic, and in whose beneficent course follow progress and civilization, traces its origin to some mountain spring that gushes petulantly forth in the midst of black and forbidding fastness.

Were the projects of the telegraph or the railroad traced, respectively, to the original inventors, the results, it is felt assured, would be sufficiently startling. In the case of the first we would find during the latter part of the last century a poor Spanish engineer, who, his comrades said, had some kind of an insane idea about sending messages by wires to great distances, even beneath the ocean. To look for the man who first conceived the idea of locomotion by steam is a still more melancholy task. Read the words of Marion de Lorme, who, in the year 1641, in company with the Marquis of Worcester, chanced to visit the Bicetre at Paris, that frightful madhouse in which were united the horrors of a prison and an inferno.

"We were crossing the court," writes De Lorme, "and I, more dead than alive with fright, kept close to my companion's side, when a frightful face appeared behind some immense bars and a hoarse voice exclaimed, 'I am not mad! I am not mad! I am not mad! I have made a discovery that would enrich the country that adopted it.' 'What has he discovered?' asked the guide. 'Oh!' answered the keeper, shrugging his shoulders, 'something trifling enough; you would never guess it; it is the use of the steam of boiling water.'"

All through the first half of the present century telegraphic experiments were going on, for it is a notable fact that though the man may die, his idea, if it contains within it the germ of truth, will thrive, and become immortal.

In 1813 signals were transmitted through seven miles of wire laid on the bottom of a pond. An English engineer officer, in 1828, made some more or less successful experiments with a cable insulated by means of tarred rope and yarn solidified with pitch. Submarine telegraphy, however, was not rendered thoroughly practicable until perfected by the brothers, John and Jacob Brett, who, over fifty years ago, laid the first ocean cable beneath the waters of the English channel.

The possibility of laying an electric cable in the Atlantic, from Europe to America, was suggested by Professor Morse as far back as 1843, but it was not until 1854 that Cyrus Field and

others discussed the means of practically realizing the idea. In 1855 negotiations were carried on in England to establish a company and raise capital, which objects were attained in 1856. The New York and Newfoundland Telegraph Company connected Newfoundland with the mainland of America by cables and land wires, but the Electric Telegraph Company undertook the laying of a cable from Newfoundland to Ireland, with a capital of \$1,750,000 in shares of \$5,000 each. A length of 2,500 English miles of cable was ordered, and was completed by the summer of 1857. A piece of this cable is to be seen in the National Museum at Washington, D. C., among the relics of Professor Morse, contrasting forcibly with the jeweled decorations presented to the great inventor by nearly every monarch in Europe. This first cable consists of a conductor of seven fine copper wires, No. 22 gauge, twisted tightly together, forming a cord one-twelfth of an inch thick, and weighing 107 pounds per mile. This thickness is increased to three-eighths of an inch by a core of three layers of gutta-percha.

Outside the core is a jacket of hempen yarn, saturated with pitch, tar, beeswax and boiled linseed oil. The outer sheath consists of eighteen strands, each formed of seven No. 22 iron wires. The whole diameter is about six-tenths of an inch, and the weight one ton per mile.

The Niagara and the Agamemnon, the one lent by the English Government and the other by this country, took each 1,250 miles of cable, and steamed forth from Valencia (west coast of Ireland) on August 7, 1857. The Niagara paid out her portion of cable as she went. On the 11th, in an attempt to slacken the rate of paying out, the cable snapped, and the end sank in 2,000 fathoms of water, 280 miles from the Irish coast. The appliances on board not being sufficient to remedy the disaster, the two ships returned to Plymouth, where the two portions of cable were placed in tanks until the following year.

In 1858 another attempt was made to bind together the two continents by the slender metal rope. The Niagara and Agamemnon were again employed, but the submersion was to begin in mid-ocean this time, one vessel proceeding eastward and the other westward, after splicing the two halves of the cable. They left Valencia June 10, but it was not until 16 days later that they could finish the splice and commence the submersion. On the 29th a double breakage took place and 114 miles of cable went to the bottom, wholly severed from the rest.

The Agamemnon returned to England for improved appliances and further instructions, and a month was thus lost. On July 29, the two ships again spliced their two halves of cable in mid-ocean, and proceeded with their work without further disaster. On August 6 the Agamemnon reached Valencia, and the Niagara and Newfoundland exchanged congratulatory messages through the whole length of cable. Soon afterward greetings were exchanged between the Queen and President Buchanan, and between a number of public

bodies and official persons. The station at Newfoundland was connected by wires and cables with the general telegraphic system of America, and that at Valencia with the general system of Europe. The cable continued working until September 1, sending 129 messages (of about 11 words each on an average) from England to America, and 271 from America to England. The signals then ceased, and the cable has never spoken since, whether because, as has been facetiously remarked, the mermaids fancied it for necklaces, or because it had simply been talked to death, it is beyond the power even of science to determine.

Although an attempt has never been made to raise this cable, no time was lost in raising capital for another attempt, and an entirely new cable, much thicker and more costly, was constructed and put through the severest tests.

As this great rope was 2,300 miles in length, and weighed more than 4,000 tons, it was evident that it would take a huge vessel to carry and pay it out. The Great Eastern, at that time the leviathan of the ocean, was selected for the task. Three enormous tanks were built in the fore, middle and aft holds, from 50 to 60 feet in diameter each, by 20½ feet deep, and in these the cable was deposited in three vast coils. On July 23, 1865, the Great Eastern started for Valencia with her burden, and all went well until August 2, when the cable snapped from overstraining and sank in 2,000 fathoms of water. Then commenced the remarkable process of dredging for the cable. A five-armed grapnel, suspended from the end of a strong iron-wire rope, five miles long, was thrown overboard, and when it reached the bottom it was dragged to and fro across the line of cable by slow steaming of the Great Eastern. The attempt, however, was unsuccessful, and the Great Eastern returned to England, leaving (including the operations of 1857-58) nearly 4,000 tons of electric cable useless at the bottom of the Atlantic ocean.

Another cable was constructed, and on July 13, 1866, the Great Eastern set forth from Valencia, accompanied by the steamers Terrible, Medway and Albany, which were to assist in the submersion and in subsidiary matters. The line of route was chosen midway between those of the 1858 and 1865 cables, a few miles from each. The Great Eastern, after a few unimportant mishaps, at length entered on the 27th the harbor of Heart's Content, Newfoundland, in triumph, accompanied by the subsidiary vessels. After congratulatory messages had been sent and received on both sides of the Atlantic, operations were commenced for recovering the end of the 1865 cable, and completing the submersion. The Albany, Medway and Terrible set off on August 1 to the spot on the ocean beneath which the end of the cable was lying, or as near to it as calculations could establish. Certain buoys, left anchored there 12 months previously, had been carried away by the storms of the preceding winter, but the latitude and longitude had been very carefully registered.

The Great Eastern steamed from Heart's Content on the 9th, and started a series of grappling

operations, which continued through the remainder of the month. The cable was repeatedly caught and raised to a greater or less height from the ocean bed, but something or other snapped or slipped every time, and down went the cable again. At last, when the patience of the crew was well-nigh exhausted, the end of the cable was safely fished up on September 1, and electric messages were at once sent from the spot to Valencia, describing this ultimate success. The relaying of this cable was begun at once and successfully completed.

It would require a considerable amount of space to enumerate the accidents and mishaps that have, in the past, interrupted the Atlantic cable system. Suffice it to say, however, that continued experiments have so perfected submarine telegraphy that accidents to the cable are now of extremely rare occurrence. Should one happen, the exact point affected is at once ascertained by an automatic electrical contrivance at the stations where messages are sent and received, and the most complete repairs could be accomplished in a very short space of time.—Exchange.

Straightening Out Wires.

J. C. Barclay, of Chicago, electrician for the Western Union Telegraph Company, spent a few days in Denver, Col., lately, straightening out the curves, as Night Manager Lawton puts it.

"You see," said the "old farmer," "we are like the railroads, and Mr. Barclay has found out that for a great many years we have been wasting force; in other words, we have been working to disadvantage, and in some cases in such a round-about way it has caused more or less unnecessary expense.

"Since our company has constructed so many wires to carry the increased business, Mr. Barclay, by a little clever headwork, has arranged the circuits so that all business between the principal cities in Colorado and throughout the United States is all being handled direct now, doing away with all relaying and unnecessary mileage. To show you how close Mr. Barclay figures these things down, while walking up Seventeenth street to-day he noticed that the cable carrying the Rocky Mountain News dispatches direct from Chicago, New York and other Eastern wires had a little slack in it after leaving our poles in front of the News office. I'm not a betting man, but if that cable is not shortened up eight and one-half inches before Mr. Barclay leaves town, I'll buy the cigars for the whole News force, providing they will smoke Wheeling stogies."—Denver Daily News.

It is announced that the Great Northern Company and the Eastern Extension Company have constructed land lines between Pekin, Tientsin and Taku, in China, in connection with the neutral cables, established last year between Taku, Chefoo and Shanghai.

A subscription to TELEGRAPH AGE is regarded as a good investment.

LETTERS FROM OUR AGENTS.

To Our Correspondents.

While we are desirous to receive from our agents letters for publication respecting their various offices and of their personnel, for all efforts of this character are appreciated, we would earnestly request that such communications be confined strictly within the limits of the subject, and not so much space be devoted to hunting and fishing items and other extraneous matter, as is frequently the case. We wish to make the department of "Letters from our Agents" an attractive one, but if we were to publish all that comes to us in the shape of irrelevant matter, of no possible interest to the general reader, it would frequently require us to surrender a number of additional pages to contain it all. The current information of any office will, if carefully chronicled, furnish a welcome digest of news that will be read with pleasure and satisfaction by thousands, and this limit should be the legitimate contents of all letters. And we wish that our correspondents would avoid the too frequent habit, at all times a bad one, of abbreviating words in writing. This is a peculiarity among telegraphers, we know, but what may be plain to the writer, and for local interpretation, is usually a mystery to the editor, and is apt to lead to error in the printed statement.

Southern Pacific Telegraph System—The San Joaquin Division.

While not occupying so conspicuous a position on the map as some other divisions, the San Joaquin is one of the most extensive and heavily bur-



MR. J. H. SHERIDAN,
Chief Train Dispatcher San Joaquin Division, Southern
Pacific Railway.

dened divisions of the system. Starting at Fresno and Mendota, in the centre of the great wheat and fruit belt of California, and stretching southward

to the great orange region of Southern California, taking in the now famous oil fields, it constitutes the important connecting link between the Coast and Los Angeles divisions, as well as between the Western and Los Angeles divisions. The San Joaquin division is composed of the Fresno and Los Angeles, main line, the Mendota, Exeter, Armona, Porterville, Pollasky and McKittrick branches, and the main line which now connects the Coast Division via Santa Barbara, upwards of 800 miles of track, with some sixty-five telegraph stations. The fifty-five trains on the time card in no way represent the amount of traffic, as a great many extras and different sections of regular trains are constantly required to handle the immense amount of local and through business between San Francisco and the East via the Sunset Route.

The head of the telegraph department of this division is J. H. Sheridan, Chief Dispatcher, with headquarters at Bakersfield. The dispatchers are: Mendota to Bakersfield—First, M. J. McGrath; second, W. B. Kennicott; third, C. O. Demsy. Bakersfield to Mojave (Mountain Division)—First, H. E. Swetser; second, E. L. Braswell; third, T. P. Lee. Mojave to Los Angeles and Santa Barbara—First, J. T. Bell; second, A. J. Henderson; third, C. Duncan. Extra dispatcher, A. Sautter; day operator, H. L. Leland; night operator, H. L. Ketchum; while J. W. Dorgan is in charge of the wires and multiplex repeaters.

Some of the principal points on this division are represented as follows:

Fresno—Messrs. Henry Avila, T. F. Brosnahan, G. M. Brewster, Wm. Holmes and Mr. Vansickler. Mendota—First, Ed. Entleman; second, G. A. Mosher; third, W. E. White. Tulare—W. A. Fothergill and S. I. Titcomb. Hanford—J. D. Fish. Visalia—W. St. J. Caudron, agent; O. R. Porter, assistant. Fowler—G. A. Leon. Kingsburg—W. R. Odom. Traver—W. W. Martin. Tipton—D. C. Rexroat. Delano—D. L. Cecil, agent and operator; R. A. Fuller, night operator. Famoso—T. E. Keller, agent; M. M. Cecil, nights. Tehachapi—C. R. Chamberlain. Cameron—H. Stamford, agent and operator; H. A. Slayton, nights. Mojave—F. B. Warner, agent and operator; R. K. Cairns, first; P. Gafvert, second; C. S. Royston, third. Lancaster—H. F. Keeler. Ravenna—F. B. Lardner, days; C. F. Tyler, nights. Ventura—G. A. Starkweather, Jr. Lemaier—J. Nesbit. Huron—Miss Bancroft. Coalinga—Miss McFee.

Want of space prevents a more complete list in this issue.

D. L. Cecil, at Delano, and F. B. Lardner, at Ravenna, are two of the oldest employees on the system, having served twenty-nine and twenty-five years, respectively.

The Mountain Division, Bakersfield to Mojave, represents one of the most famous and dextrous pieces of railroad engineering in the world. The lowest pass, being 4,000 feet above the level of the sea, for a time baffled the shrewdest engineers, but finally, by doubling back upon and crossing itself, forming a complete loop, nature was triumphed over.

SAN FRANCISCO, CAL., WESTERN UNION.

Arrivals.—R. S. Hawcroft, Vancouver; W. G. Eccles, Fresno; Frank A. Jayne, Ithaca, N. Y.; W. E. Brooks, Winnepeg, and C. W. Hamilton.

Departures.—Messrs. Turk, to Los Angeles; Summerl and McCandlish, to Sacramento.

Mr. E. B. Peppin rejoices in the birth of a son.

W. J. Kirkwood, employed in this office for the past fifteen years, committed suicide by taking chloral. His mind was unbalanced, and he had recently been confined in the asylum at Stockton, but was discharged a few days ago, supposed to be cured. With freedom his old mania of suicide returned, with the sad results stated. Mr. Kirkwood was quite a noted character in telegraphic circles, being very generous in dividing his earnings among the poor. A number of years ago he inherited \$20,000 from a relative, but refused to accept it, believing it to be wrong to receive inheritances.

CHARLESTON, S. C., WESTERN UNION.

Few changes have occurred the past three months, the only departures being Messrs. Clack and Galloway, who were both fortunate in securing better positions elsewhere. Following is the personnel of our present force:

Mr. D. M. O'Driscoll, manager; H. J. Carpenter, chief operator; H. C. Wallace, assistant chief operator; P. E. Ryan, night chief operator. Operators—J. W. Ryan, P. O'Reilly, B. W. Partridge, Jr., J. A. Partridge, R. L. Wallace, R. C. Reed and Edward Skerritt. Victor O'Driscoll, receiving clerk; J. F. Brenner, son of Superintendent Brenner, of Augusta, bookkeeper, and Louis Bartelle, delivery clerk, with a force of twelve messengers.

At the Cotton Exchange, Mr. W. J. Fleming is in charge; at the Charleston Hotel, W. A. Frupp.

Business holds up fairly well, though no extra force is required, the regular men always being willing to "scoop."

T. C. Brandon, of Chicago, was a recent visitor to this office, having arrived from Mexico on the trading steamer "Muchacha." Mr. Brandon exhibited some beautiful opals, Mexican drawn work, and a small but rare botanical collection, a part of which he disposed of in this city to the Charleston Geographical Society.

Mr. R. C. Reed is considered quite a comedian, and promises to make his mark in Irish comedy; in fact, we understand he has received a very flattering offer, which it is thought he will accept.

EVANSVILLE, IND., POSTAL.

The personnel of this office is made up as follows: Charles Shea, manager; W. A. Boyer, S. L. Dunning, and W. D. Herbst, operators; Miss Ella Boyle, cashier; J. A. Dugan, lineman, and six messengers.

A recent photograph taken of this force presents an intelligent and bright-looking staff. Manager Shea is in the foreground, while grouped about him are the messenger boys in their new district telegraph uniforms, and the lineman, the operators and Miss Boyle being in the background. The latter, however, loses no time coming to the front when business requires.

CHICAGO, ILL., WESTERN UNION.

Mr. E. E. Cunningham took a flying trip lately to Clinton, Ind., his home.

Mr. James Cummins is recovering from his illness and is expected shortly to resume his duties in the St. Paul division.

Miss Mollie Gibbons has the sympathy of all in the death of a favorite brother in St. Louis.

Mrs. Hanson's husband is very ill, and is at the Alexian Brothers' Hospital.

Mr. Miles Standish lost his mother recently. She was buried at Columbus, Ohio, Mr. Standish's former home.

The big task of vaccinating the 2,200 employes of the Western Union force at this point is progressing merrily, the undertaking being confided to a doctor in the building.

Mr. Evan Jones, chief of the signal department, has been engaged in the stock business at Springfield, Ills., for a few weeks.

Mr. Thomas Nathan has been appointed as operator under A. C. Murphy, on Cottage Grove avenue.

Mr. D. W. Brown, of Armour & Co., formerly of a Western Union branch office, who has been very ill with appendicitis for the past week, is reported to be on the road to a speedy recovery.

Ohm Court, No. 673, C. O. F., composed of telegraphers, gave their third annual ball January 25, at Oakley Hall. The grand march was led by Mr. and Mrs. W. R. Holligan, and the affair was a decided social and financial success.

The many admirers of our old-time friend, Edward Everett, will be pleased to hear of his marriage to Miss Miabelle Wisdom on February 2. The bride is one of the brightest and best-known young women of Englewood society. Both start out in life under most favorable circumstances, and each have our unlimited good wishes for the future. Mr. Everett is just completing his legal studies.

Miss Edythe Marie La Chappelle, formerly manager of the Western Union office at Evanston, Ills., was married lately at that place to Mr. Baxter Bardwell Noyes. Many members of the telegraph fraternity were present.

The Chicago Telegraphers' Aid Society held its twelfth annual meeting January 27. The election of officers resulted as follows: J. Gallagher, president, Western Union Telegraph Company; P. F. Miller, vice president, Postal Telegraph Company; Joseph Laird, secretary, Board of Trade; W. E. Griffiths, treasurer, Postal Telegraph Company; executive committee, F. W. Rothery, C. A. Hawkins, F. M. Crittenton, Henry Jahn, O. M. Olsen, D. S. Anderson, E. G. Wells. The treasurer's statement for 1900 shows a cash balance on January 1, 1900, of \$1,281.19; receipts for the year, \$3,840.47. Total, \$5,121.66. Disbursements: Sick benefits, \$2,696.72; death benefits, \$600; expenses, \$307.76; balance on hand January 1, 1901, \$1,517.18. Total, \$5,121.66. These figures show that the society is in a healthy and flourishing condition and progressing steadily. The membership was 678 on the first day of the year.

KANSAS CITY, MO., ASSOCIATED PRESS

Mr. John Charvart, who, for the past three years, has manned the second wire with great ability, and missed the benefits of home, has finally succumbed to the inevitable and taken unto himself a wife, Miss Louise Draper, of Ellsworth, Kan., a very charming girl.

Mr. W. W. Leeds, chief operator, has returned to work after a ten days' siege of grip.

Mr. W. W. Flynn has just buried his brother, John R. Flynn.

Mr. E. S. Fable, of Topeka, Kan., has been taking the "early" during Mr. Leeds' illness, and while Mr. Flynn was absent on account of his brother's illness.

Mr. E. E. Shawn, the veteran Associated Press man, who has been connected with The Star for several years, occasionally "sets in" for the boys.

Mr. J. B. Nelson, who came from the New York office last August to edit the Overland report, has made a host of friends by his genial, wholesouled manner.

Mr. Charles L. Reed, who has grown up in the office, and for the past eight months has been acting as clerk to Mr. Cutter, is fast developing the true principles of an Associated Press man, a good electrician and operator, and is becoming a good newsman.

Mr. J. M. Bonham, who is in his last year at the University Medical College, is already being called "doctor" by the boys, who occasionally seek his advice in a medical way.

Mr. U. L. McCall, the new night local editor, has the reputation of being the "longest" man in the service—he is six feet three. His work makes it plain that his aspiration for still greater heights will be realized.

CINCINNATI, OHIO, POSTAL.

Recent visitors were as follows: Minor M. Davis, traffic manager, New York; E. J. Nally, general superintendent Western division, and C. M. Baker, general superintendent of construction Western division, of Chicago; J. E. Morse, manager, Middletown, Ohio; R. P. Roseberry, manager, Lafayette, Ind.; C. A. Blair, manager, Rich-

**Beware of Ointments for Catarrh that Contain
Mercury,**

as mercury will surely destroy the sense of smell and completely derange the whole system when entering it through the mucous surfaces. Such articles should never be used except on prescriptions from reputable physicians, as the damage they will do is tenfold to the good you can possibly derive from them. Hall's Catarrh Cure, manufactured by F. J. Cheney & Co., Toledo, O., contains no mercury, and is taken internally, acting directly upon the blood and mucous surfaces of the system. In buying Hall's Catarrh Cure be sure you get the genuine. It is taken internally, and made in Toledo, Ohio, by F. J. Cheney & Co. Testimonials free.

Sold by Druggists, price 75c. per bottle.
Hall's Family Pills are the best.

mond, Ind., and Miss M. S. Griswold, manager, Hamilton, Ohio.

Mr. C. D. Ely, of the superintendent's office, recently spent a few days in Cleveland and Painesville, Ohio, on account of the death of an uncle at the latter place.

The prospective Jeffries-Ruhlin sparring contest has given press business quite a spurt.

A new office has been opened in the Iron district with A. T. Duckett as manager.

A Postal office at Norwood, Ohio, with R. Whalen as manager, is another new one.

Miss Isabella Kellermeyer has been assigned to Millcreek branch, vice A. T. Duckett, who goes to the Iron district branch, and Miss Cecelia Vogel to Gerdes' Hotel, vice Miss Kellermeyer.

John Garner is still confined to his home with muscular rheumatism.

ATLANTA, GA., WESTERN UNION.

Mr. Jake Havis is receiving the congratulations of his friends upon the birth of a son.

The grip has caught a number of the men of late. Messrs. P. H. McDowell, J. M. Norman, night traffic chief; and W. R. Stuart are at work, after several days absence with the disease, while Messrs. Broadbent, Goodrum and Ballard are down with it.

Mr. John S. Scott has resigned and gone with Murphy & Co., leased wire system, at Athens, Ga.; R. J. Bellamy is subbing for the same firm in Montgomery, Ala., and W. J. Griffin does the black-board work at Greenville, Ala.

Mr. C. A. Darlton, Superintendent of Telegraph for the Southern Railway, headquarters in Washington, was a recent visitor.

Mr. W. T. Gentry, recently appointed general manager of the Southern Bell Telephone Co., is an old telegraph operator. The fraternity congratulate him upon his steady rise with the telephone company.

PHILADELPHIA, PA., POSTAL.

The most conspicuous order lately put into effect was one which directly affected such operators employed on the night force who also work broken positions during the day; and quite a number of men on the day force, who were desirous of, but could not procure, any extra. In order to favor the latter class, it was found necessary to release a number of the former grade. These broker operators, however, will take kindly to this action, as they have realized, in frequent instances, that the Postal was always ready to give them some employment when their outside positions failed. Eight men on the day force are now given their coveted extra, with the prospect of more being called upon should it be decided to release other broker operators still retained on the night trick.

After spending considerable time in recuperating strength, Mr. William Madden has resumed his place on the first New York bonus. His side-partner, Mr. J. A. Thomas, found the constant heavy tension too severe, and called for a change. He was accommodated by the appointment of Mr. Roscoe Smith as alternate.

Miss Etta J. Stratton, from Conshohocken, has

been transferred to this office. She is relieved by Miss Mabel V. Thwaite.

Mr. William Bowers is temporarily acting as receiver at the public counter nights during the absence of Mr. Morris, who is laid up with the grip.

We were favored by a visit from Mr. William J. Mundell, of the New York Electrical Department.

Mr. Zene Stoddard is the happy father of a daughter, the first child, and "Uncle" Bob Stoddard is greatly delighted with his new title.

With the opening of the new branch American District Telegraph office in the Real Estate Trust Company's building, a new position has been created and Mr. Daniel Carlin selected to fill it. He will assume the supervision of and act as solicitor for the offices located in the Harrison, Betz and Real Estate buildings. Mr. Christian Troeller succeeds Mr. Carlin in the position vacated at the Harrison building, with Mr. O. C. Crist, late of the West Philadelphia American District Telegraph office, in charge of the Betz building office, and Mr. Philip Reilly in charge of the new office in the Real Estate building, all of whom will be responsible to Mr. Carlin.

Mr. Samuel Lewallen acted as substitute for Manager John Hope, who was detained at home by the grip.

The Electrical Aid Society appears to have branched out on definite lines, according to the ways of the world, to increase sociability among its membership. Through the leadership of Chairman Hudgins and several meetings of his committee, arrangements have been made for a progressive euchre party and dance, which promises to be a very successful affair.

NEW YORK, POSTAL.

Mr. George Carroll has resigned on account of ill health and gone to his home in Canada.

Mr. George F. Randolph, of the leased wire board, has recovered from his recent illness and is back on duty again.

Mr. O. H. Davidson has been absent for the last three weeks, owing to a severe attack of bronchitis, from which he has not yet recovered.

Mr. M. W. Russell, of the night force, has returned to duty, after an illness of three weeks.

Mr. Charles Adams, of the Eastern division, who has had the grip, is at his desk again.

Mrs. Knerr, of the Eastern division, who was absent for a few days on account of illness, has returned to her post.

Miss Etta Tyrell, of the City department, has quite recovered from her recent illness.

Miss Viola Howe, of the City department, who resigned several days ago, and Mr. F. L. Doshier, a young business man of Brooklyn, were married February 14. Numerous friends wish the happy couple all manner of prosperity and happiness.

Mr. C. F. Leonard, formerly manager of the Cortlandt street and Broadway branch office, and more recently manager of the Buffalo, N. Y., office, has been appointed manager of the branch offices at Nos. 533, 621 and 703 Broadway, 125 Avenue D, and at the corner of the Bowery and Canal

street. His staff is made up as follows: No. 533 Broadway, J. Keegan, chief operator; C. O'Rourke, operator; E. M. Tillman and T. J. Ryan, clerks; 621 Broadway, Mrs. Moore, operator; 703 Broadway, William Finley, chief operator; D. Mangan, operator; D. Juffett, M. Mack and A. Peterson, clerks; 125 Avenue D, D. J. McCauley, operator; Bowery and Canal street, S. Ochs, operator.

At the office, 853 Broadway, corner of Fourteenth street, the personnel is made up as follows: James P. McBurney, manager, formerly manager of the offices at Elizabeth and New Brunswick, N. J.; A. G. Sullivan, chief operator; J. G. Pierce, day operator; W. F. Drake, night operator; William Wolf, relief operator; J. J. O'Brien, receiving clerk; M. Roche, statement clerk, and Miss Aleda Kroeger, delivery clerk.

NEWPORT, R. I., WESTERN UNION.

The occasion of the Vanderbilt-French wedding, which occurred here January 14, attracted a large number of representatives from New York and Boston papers.

Had the wedding occurred in probably any other city of this size in the United States, special arrangements would have been made to handle the press matter. But Newport's capacity for handling a rush of business, such as occurs here yearly during the summer months, made this task an easy one.

Manager A. Woodle and Chief Operator George Ferrin, assisted by Operators Rowe, Austin, Howard and Harrington, handled upwards of 125,000 words concerning the wedding.

TORONTO, ONT., CANADIAN PACIFIC.

Mr. Sturrock, our local manager, has recovered from his recent illness, and is able to resume his duties at the office again. During his absence Mr. Phillips was the acting manager.

Mr. John Richardson, one of our "checks," has recovered from an attack of diphtheria that kept him in the hospital a month.

Broker positions appear to be coveted. Operators who have gone from this office to fill such are as follows: Mr. Daniel Urquhart, with Dixon & Co.; Mr. Harry Wilson, with Pellatt & Pellatt, and Mr. William Barber, with A. Ardagh & Co.

Business has not picked up very much as yet, but now, that the Dominion House is in session, no doubt a greater activity will soon prevail.

MONTREAL, QUE., CANADIAN PACIFIC.

Business is again picking up gradually, and we are now ready for the session work, which started on February 7, with the opening of the Ottawa Parliament. The speech from the throne was speedily handled by our staff, copies of the same being received and delivered ahead of the other company.

Mr. Jas. A. Collie has resumed his duties on the copper wire after a prolonged illness.

Miss J. Lucas and Mr. H. Keating are on the sick list.

Mr. A. W. Barber, superintendent at Toronto, Ont., was a recent visitor.

Harry Forsythe, of the superintendent's office,

has recovered from an attack of grip and is around again.

Resigned—F. T. Robinson and Charles Elwell. The former has accepted a position with the Great Northwestern at Ottawa.

Owing to the recent fire, which destroyed the Board of Trade and several other buildings, Mr. G. W. Bancroft was put out of business for a day or two. A vacant space in the old Corn Exchange building, however, was soon secured, where Mr. Bancroft is now again at work. Mr. F. T. Jennings and Mr. F. J. Richardson did the needful in connecting the wires. Mr. Bancroft lost all his wires and office fixtures. No insurance.

Death—On January 10, Mary Loretto, aged 17 months, infant daughter of J. H. Egli.

Birth—On the 9th inst., a son to Mr. and Mrs. J. A. Fortier.

PHILADELPHIA, PA., WESTERN UNION.

On April 10 the Electrical Aid Society will give a progressive euchre, hop and banquet, the first of its kind since the society has been organized. It should be well patronized. The entertainment committee, consisting of Messrs. Sisk, Mecredy, Fitzpatrick, Hudgins and Culp, are bending every energy to make it a grand success, which no doubt it will be. Put your shoulder to the wheel, boys, and make the occasion a criterion for others to go by.

Miss Wilde, daughter of Wire Chief J. T. Wilde, who has been critically ill, is now convalescent.

We regret very much to announce the death of Peter Becket, a well-known Pennsylvania Railroad agent at Newfield, N. J.

The home of Mr. Samuel Warnock, day editor of The Associated Press, this city, was the scene of a conflagration recently, causing a loss of several hundred dollars.

Miss Sadie Arthur is enjoying several weeks' vacation.

W. C. Boyer is at his home in Dover, Del., recovering from a fit of sickness.

O. M. Pennypacker is the proud father of a son.

Rev. H. C. Fox, D.D., of Freehold, N. J., was a recent visitor and enjoyed the sights of a large telegraph office.

KANSAS CITY, MO., WESTERN UNION.

Our genial manager, M. D. Wood, with others of the Commercial Club, are making a combined business and pleasure trip through Texas, Indian and Oklahoma territories, and Kansas.

Mr. E. S. Cowie, formerly a collector of this office, and Miss Eleanor Pierson, whose resignation as manager at Coates Hotel branch was recently announced, were married on Friday, Dec. 27, and left immediately for an extended trip through Colorado and Utah.

The many friends of Morse H. Markley, were saddened by the receipt of a telegram announcing the death of his wife, which occurred at Eureka, Mo., on Sunday, January 27. She will be remembered by those who worked here ten years ago as Miss Katie King, the winsome little check girl of the Wheatstone department.

Mrs. Archie Rainey, who fell from a street car and sustained severe internal injuries last October, and who has been very ill at the German Hospital, this city, is at home again and is recovering, which will be welcome news to the many friends of both Mr. and Mrs. Rainey in the telegraph profession.

Among our late arrivals we note that of Mr. V. Shackelford, from St. Louis. He will enter the employ of the Christie-Street Commission Co.

NEW YORK, WESTERN UNION.

Mr. Walter B. Richmond, night manager of 12 West Twenty-third street office, has recently become a grandpa, and it is quite safe to say he is the youngest one in the profession.

The Court Belle Branch, No. 24, Foresters of America, of which a number of operators are members, held a free vaudeville entertainment at the Lenox Lyceum in this city February 7. All present had an enjoyable time.

Mr. John J. Lynch, of this office, who served in the U. S. Volunteer Signal Corps throughout the Spanish-American war, has enlisted in the regular U. S. army, and is awaiting transportation March 1, from David's Island, N. Y., to the Philippine Islands.

Mr. Clarence Pendergast, formerly employed in this office, sailed from Boston February 3 for Cape Town, South Africa.

Mr. George Murphy, of the Stock Exchange, has the sympathy of his many friends in the death of his wife, which occurred January 30.

Miss Josephine S. Mullaney, who was employed at "195" for several years, latterly by a brokerage firm, died January 31 at her home in New York. Miss Mullaney was one of the best lady operators in the city, and was very popular.

Mrs. E. M. Hayden, whose long absence was caused by an attack of the grip, has not yet sufficiently recovered to resume duty.

Mrs. E. R. Mott and Mrs. S. G. Crans, of the Commercial News department, have returned to duty, after a month's illness.

Mr. John M. Casey, who left us March 23, writes from Denver, Col., saying that he is much improved, physically, by the change.

"41 Buren," for Van Buren, is one of the latest.

The Ellis Island, New York Harbor, Western Union office has been opened up, and Manager J. J. McCabe, ably assisted by Messrs. Joseph Pinto, A. J. Davis and S. Werstein, all accomplished linguists, have been placed in charge.

Mr. James W. Sisk, the building electrician, resigned February 7. Mr. C. N. Boileau, formerly employed by the Western Electric Company, has been appointed in Mr. Sisk's place.

NEW YORK PRODUCE EXCHANGE BRANCH.—Always a busy place, on an active market the force

at this office is frequently taxed to its utmost to handle the immense volume of business. Manager Eipper and Chief Operator Bange have about them a carefully selected set of men, and everything moves like a piece of machinery. The personnel is as follows: Manager, T. C. Eipper; Chief Operator, G. W. Bange. Operators—A. D. Taylor, Gordon Blair, M. F. Hackett, Geo. A. Boyer, A. J. Dunham, J. E. Lynch, I. W. Garnett, M. J. Kelly, Wm. Lynch, J. D. Wooten, E. F. Maher, Joseph Peavoy, W. J. Welker, Miss H. E. Hennessey and Miss C. W. Stevenson. Short force—R. L. Kitts, D. J. Willis, J. E. Tower, Harry Gill, D. S. Talmage, A. MacKinnon, L. H. Chaillou, F. M. Casey Wm. Martin, J. G. Longmire, E. W. Morrison. Clerks—Miss M. M. Findley, J. W. Herrmann, J. J. Carey, Noel Gray, F. J. King, H. A. Jacobs, F. A. Lynn, Harold Price, H. C. Flynn.

Typewriters expressed or sent to our shop, repaired or rebuilt at lowest prices for operators. Cylinders, ribbons, at reduced prices; machines bought, sold and rented. Wall & Butler, 57 Dey street, New York. (Adv.)

Any fifty-cent piece of music mailed eighteen cents. Rusticana, Anchored, Calvary, Palms, Flower Song, ten cents each. Anything at less than half publisher's price. I will sell you a good piano for one dollar per week, from \$35 up. B. L. Brannan, 195 Broadway, New York. (Adv.)

Telegraph Linemen's Error.

A strange condition of affairs has developed in connection with the construction of the Yukon telegraph line from Quesnell, B. C., to Telegraph Creek and Atlin. Construction was completed between Quesnell and Hazleton, and then a party was sent out from Hazleton to continue construction north, while simultaneously another party was war started out from Telegraph Creek to work south, and make connection with the Hazleton party about half way between those two points.

In their work one party struck along a certain valley, and the other party along an entirely different valley. The result is that the actual work of construction has overlapped, but instead of the wires being connected, the ends are seventy miles apart, with two gigantic ranges of mountains intervening. The result must be the destruction or abandonment of a large portion of the line already built, and the building of a new line.

TELEGRAPH AGE should go regularly to every one interested in the telegraph. Write for sample copy.

Readers of the TELEGRAPH AGE are referred to the advertisement of the Montauk Cable Company on page two of the front cover. (Adv.)

The Modern Service of Commercial and Railway Telegraphy (8th Edition, revised and enlarged), by J. P. Abernethy. The theory and practice, including railway station and express service. Arranged in questions and answers. 425 pages, 40 illustrations. Price \$2.00, expressage prepaid. Address John B. Taltavall, The Telegraph Age, 253 Broadway New York.

IMPORTANT TO YOU

J. S. TOWNSEND—The Telegraphers' Jeweler, 1554 Wabash Ave., Chicago, offers any article in his elegant stock at net wholesale prices. A rare opportunity. Any watches or jewelry advertised can be bought at a lower price from this well known firm, J. S. TOWNSEND, 1554 Wabash Ave., Chicago. Our 400-page catalogue sent on application. Agents wanted. Established 1867.

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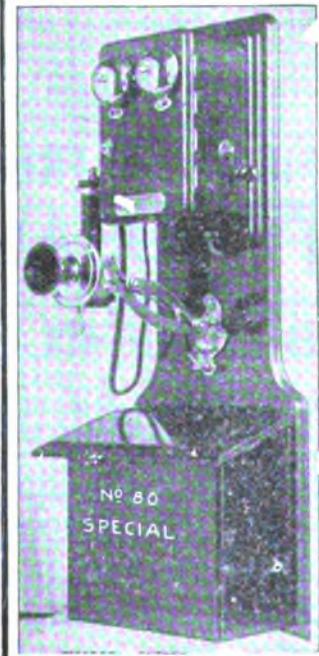
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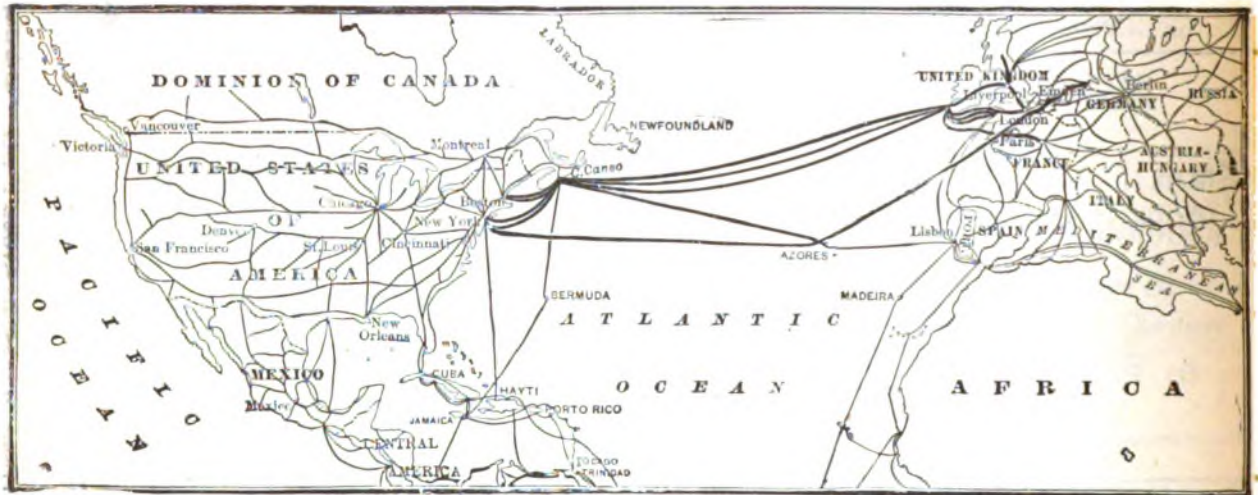


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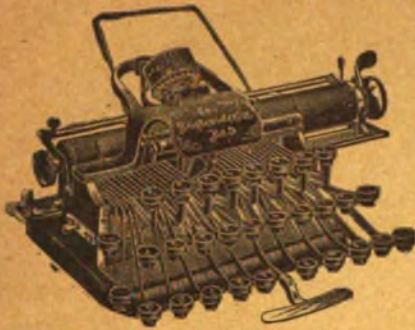
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